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49 CLIFF ST., NEW YORK.



# THE IRON AGE

THURSDAY, APRIL 30, 1903.

## The New Works of the American Turret Lathe Mfg. Company.

In designing the plant of the American Turret Lathe Mfg. Company of Warren, Pa., the following considerations were given prominence:

First, the design to be such as to permit of systematic increase without disarranging the original plan of operation.

Second, to provide that each unit of floor space should

for manufacturing very light machinery, and therefore no provision was made for cranes. It was a very efficient shop for the class of work to be done, but was hardly of a character to serve as a model for a shop making medium and heavy machinery. One of the next shops to be built was that of the Straight Line Engine Company of Syracuse. This shop is of a semi-saw tooth character, the erecting shop being of the ordinary construction; the machine shop had two bays arranged with saw tooth light. The great objection to this shop lies in the fact that the column spacing is only 8 feet, making practically a wall of columns across the shop. In the plant about to



*View of Large Tool Department.*

### THE NEW WORKS OF THE AMERICAN TURRET LATHE MFG. COMPANY.

be fully and completely lighted, provision to be made that additions would not cut off the initial light.

Third, to have the best possible crane facilities, taking into account the character of the work to be done. The large majority of machines to be built weigh less than 5000 pounds; a considerable number weigh from 10,000 to 20,000 pounds, and an occasional machine weighs as much as 40,000 pounds.

Next, the tools to be arranged in departments, classified according to the work to be done. Last, arranging an electric power transmission based on logical grounds.

While the president of the company, C. M. Conradson, favored as a general proposition the saw tooth roof for machine shops, he did not know of a plant that appeared to meet the requirements of modern practice. The number of saw tooth shops in this country is limited. One of the first to be built was the shop of the De Laval Cream Separator Works at Poughkeepsie. This was built

be described this feature is obviated by the truss system adopted. One of the latest examples of the saw tooth roof for medium and heavy work is the plant of the De Laval Engine Company at Trenton. This again is a composite design, no provision being made for traveling cranes in the saw tooth portion of the shop.

Mr. Conradson's experience in designing and handling machine shops has shown the absolute necessity of ample light in every portion of the shop, the most complete crane service, and the necessity for a minimum number of columns supporting the roof. Furthermore, he believes that the efficiency of the erecting department of the ordinary shop has been destroyed by placing a large number of heavy tools on the erecting floor, thereby making it a poor machine shop and a poor erecting shop. In this design he decided to leave the erecting shop free from machine tools, and to provide ample crane facilities in the machine shop for handling all machine work.

He also decided to arrange the cranes in the machine shop at right angles to the erecting shop, and project the crane runways (Fig. 3) into the erecting shop, so that material can be handled from one crane to the other

in a portion of the shop measuring 12 feet 7 inches to the lower chord. The machine tools in this shop requiring crane service are grouped in bays measuring 20 feet to the lower chord. The erecting shop cranes neces-

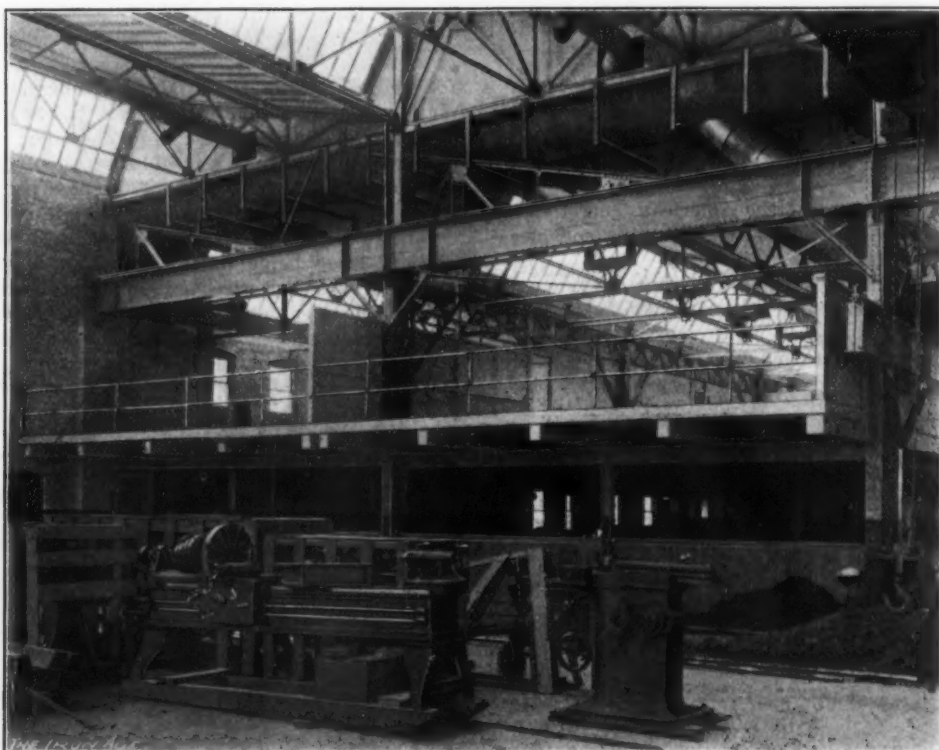


Fig. 2.—View of Gallery.



Fig. 3.—Erecting Shop.

THE NEW WORKS OF THE AMERICAN TURRET LATHE MFG. COMPANY.

easily and economically. This arrangement is new and in use has shown its great value over any other arrangement.

Another essential feature in a shop handling medium and heavy work is well illustrated in this plant. The small tools that do not require crane service are grouped

sarily are above the machine shop cranes, and this established the height of the erecting shop at 29 feet 7 inches to the lower chord. These heights are therefore necessary in any shop of this character if economy and first cost and efficiency in operation are given the prominence they deserve. This is the first saw tooth erecting shop



ever built—that is, the first of any considerable size and in which there are properly arranged crane runways.

lathes and screw machines. Over each is a foreman, as it is almost impossible to get a machine foreman who is

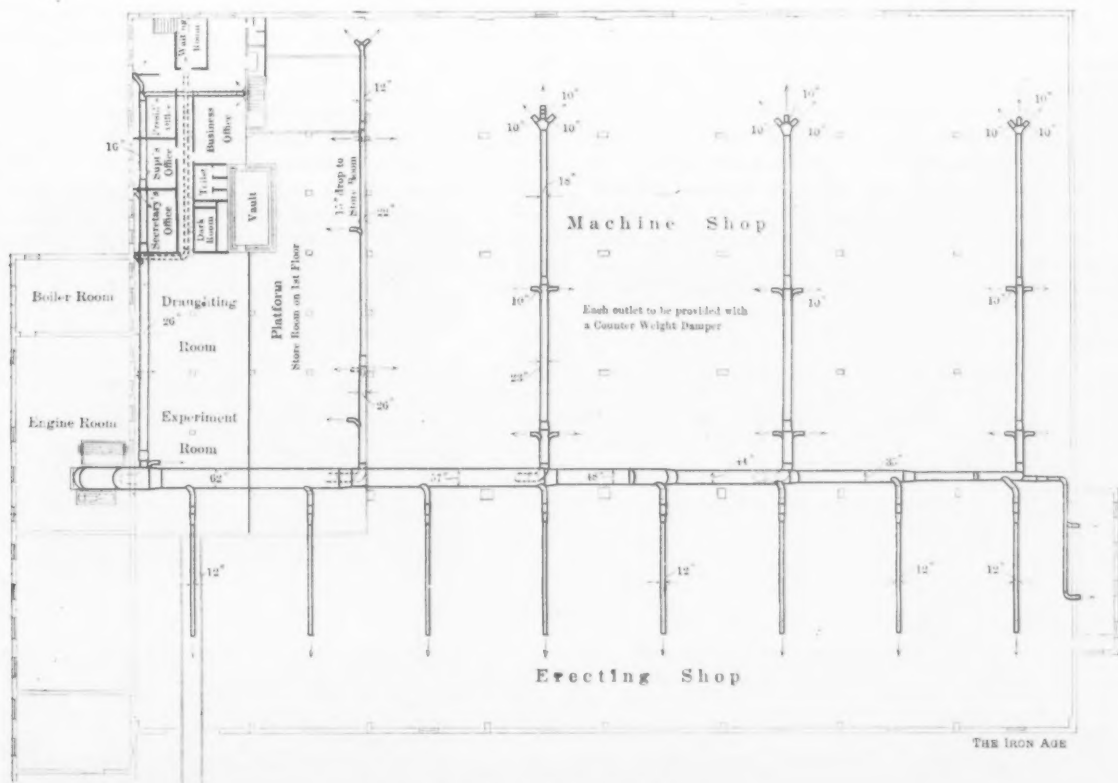


Fig. 4.—Plan Showing Heating System.

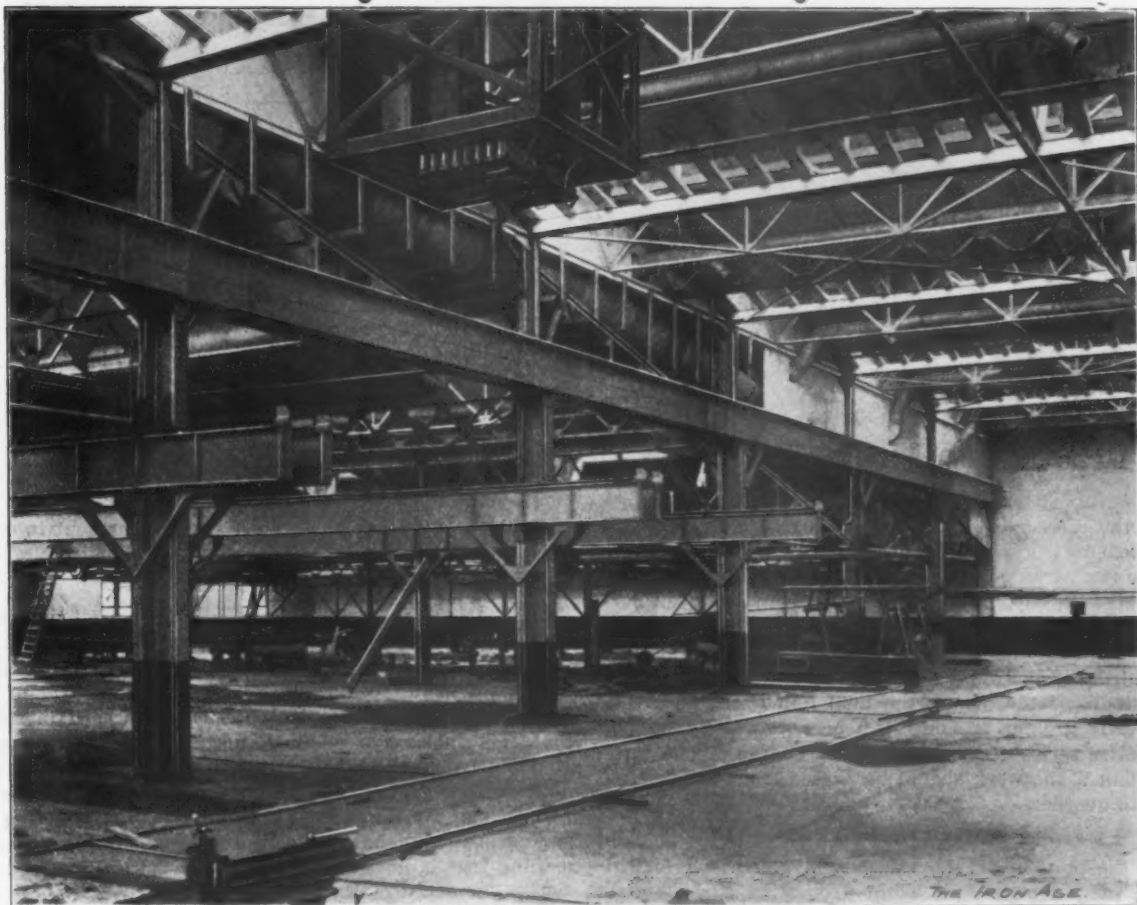


Fig. 5.—View Showing Projecting Crane Runways.

#### THE NEW WORKS OF THE AMERICAN TURRET LATHE MFG. COMPANY.

##### Arrangement of Tools.

The tools in this plant are grouped in the following ways: First, planer department; second, drilling and boring machines; third, milling and gear cutting machines; fourth, engine lathes and grinding lathes; fifth, turret

equally competent on all kinds of tools. Furthermore, there are many advantages to be gained by the grouping of similar tools. In the turret lathe department, for instance, all the tools necessary for turret operation will be grouped, and in many cases the second operation will

be finished on a different machine from the one doing the first operation. A careful foreman can very greatly reduce the cost of turning out the work by grouping similar or nearly similar jobs. For instance, if a turret lathe happens to be set for boring 2-inch holes, an obvious gain will result if the foreman puts all his work having 2-inch holes on the lathe in succession. The same is equally true of the milling and gear cutting department, the engine lathes and grinding lathes, and boring and drilling machines. In the lathe department, suppose that the foreman is given an order to make a certain number of cylindrical bars of machine steel, 24 inches long by  $2\frac{1}{2}$  inches in diameter. In this plant the operation for finishing this work will be as follows: The bars will come from the steel room, cut off, centered and the ends

In this case the electric drive was adopted, as it was thought it would result in superior economy in transmission. The following rule for electrical insulation was adopted: Install all tools under the traveling cranes with individual motors; for all other tools use line shaft drive. All the heavy machine tools requiring crane service are, of course, set up under the cranes. All of the tools in the low section of the shop (Fig. 8) not requiring crane service are line shaft driven. It is a mere incident to the general design of the plant that each line shaft is motor driven. Mr. Conradson thinks that the time is coming, and coming rapidly, when all tools will be individually driven, but any one that has had experience in connecting motors to commercial machine tools will not care to repeat the experience if time is any ob-

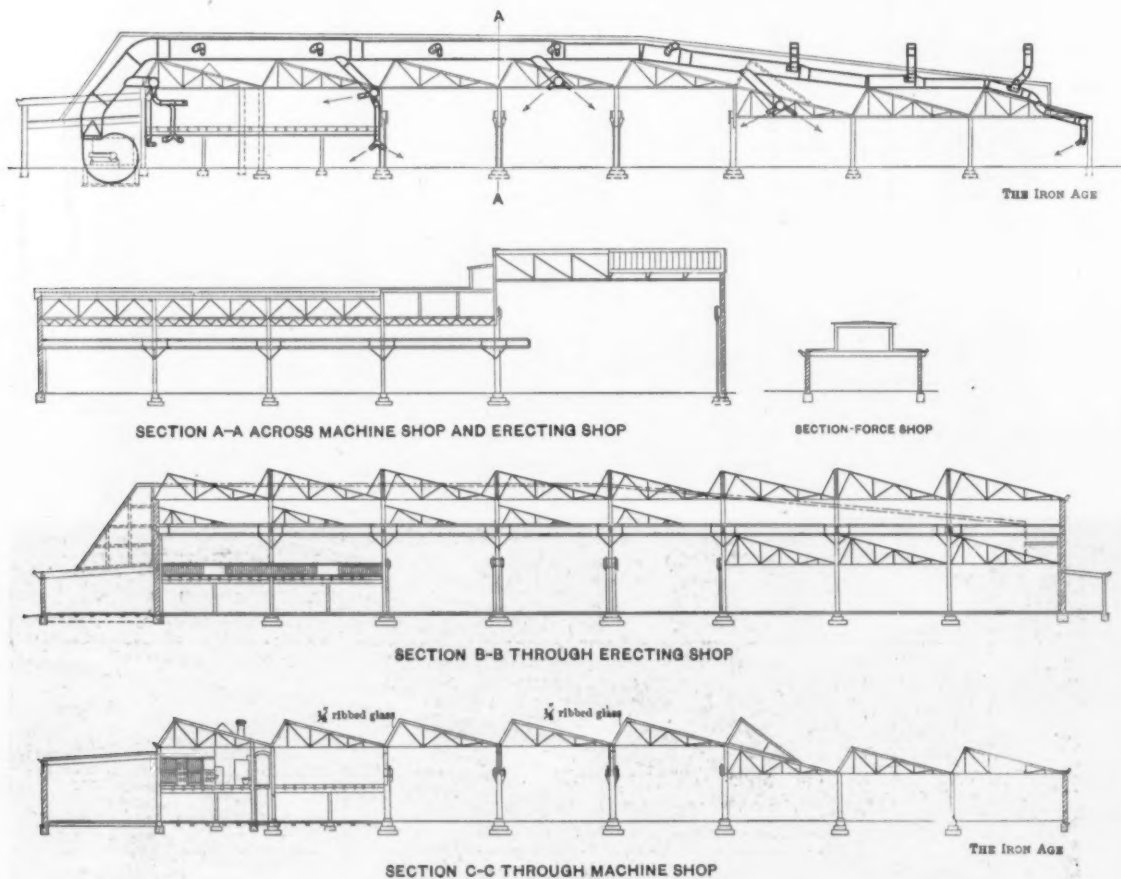


Fig. 6.—Details of Building.

#### THE NEW WORKS OF THE AMERICAN TURRET LATHE MFG. COMPANY.

faced the correct length. The first operation will be to put them in a gang lathe for roughing out. This lathe will be run at very high speed and coarse feed, removing the metal rapidly, but leaving a rough and uneven surface. From this machine the work will go to a finishing lathe, which will finish the bars within a few thousandths. The third and final operation will be to send the bars to the grinding lathe, where the final finish will be given. Manifestly greater economy can be obtained by having this entire series of machines in the charge of one foreman than if the work should be passed from one department to another.

#### Electric Transmission.

In the opinion of Mr. Conradson, there is a logical reason for the method of motor driving he has adopted. At the present time the question of electric driving of machine tools is in a very chaotic condition. One engineer gravely announces that he believes in group driving; another will with equal gravity hold firmly to individual driving. The facts in the case are that frequently neither one has a good reason for the method he advocates. In spite of all this the electrical driving is coming in, in the face of all the opposition that has been made by machine tool builders.

ject. Constant speed motors are used throughout in connection with a mechanical speed varying device.

#### Heating and Ventilating.

All parts of the plant are heated and ventilated by the Sturtevant hot blast system, as shown in Figs. 4 and 6. The apparatus consists of a 9-foot fan drawing air through a heater containing several thousand feet of 1-inch pipe, the fan and pipe coils being incased in steel plate housings. The steam connections are so arranged that a part or the whole of the heater may be used as desired, thus making it possible to control the temperature of the air throughout the building and effecting a saving in the amount of steam during moderate weather, a thing that is not easy to accomplish with direct radiation. The speed of the fan may also be reduced during mild weather. The fan and heater are placed in the engine room and the fan is driven by a direct connected horizontal steam engine, which exhausts into the heater, thus costing practically nothing for operation.

The heater is so arranged that the air may be taken either from the factory or from out of doors. It is discharged from the fan directly upward into an extensive system of galvanized iron piping, by which it is distributed thoroughly and evenly throughout the building.



in such a manner as to avoid drafts and to prevent unevenness of temperature. In planning the piping system great care has been exercised to avoid interference with the operation of traveling cranes and other machinery.

**Cost.**

In conclusion a few figures on the cost of the plant under present conditions may be of interest. The foundations of the plant are concrete; the walls are of brick and

This figure is very low and was only obtained by the closest economy in design and the exercise of great care in letting contracts.

During a suit for damages by a boiler explosion in England it was shown that the fire box leaked badly. Some one chanced to notice it and sent for a boiler maker to put in some more stay bolts, but he did not come. The boiler was continued in use, and continued to "bulge," so much so that the man in charge, who said he was a baker before he was an engineer, thought something should be done about it, but as no one else thought so, he had to take his chance. The boiler finally solved the problem itself by collapsing, when it was found that the sheets were wasted to  $\frac{1}{8}$  inch in thickness, the original thickness being  $\frac{3}{8}$  inch. The verdict of the intelligent jury was that since the owner had lost his boiler they did not wish to be hard upon him, and he only had to pay \$75 for being ignorant of the management of steam boilers.

A striking example of friction of bearings is furnished by that of high powered marine engines of the direct connected type. From necessity the connecting rods of these engines are very short to keep them low down in the vessel, seldom more than twice the stroke, which then forms an acute angle with the guides. The

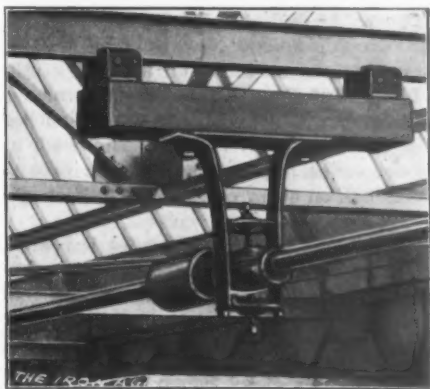


Fig. 7.—Method of Hanging Shaft.

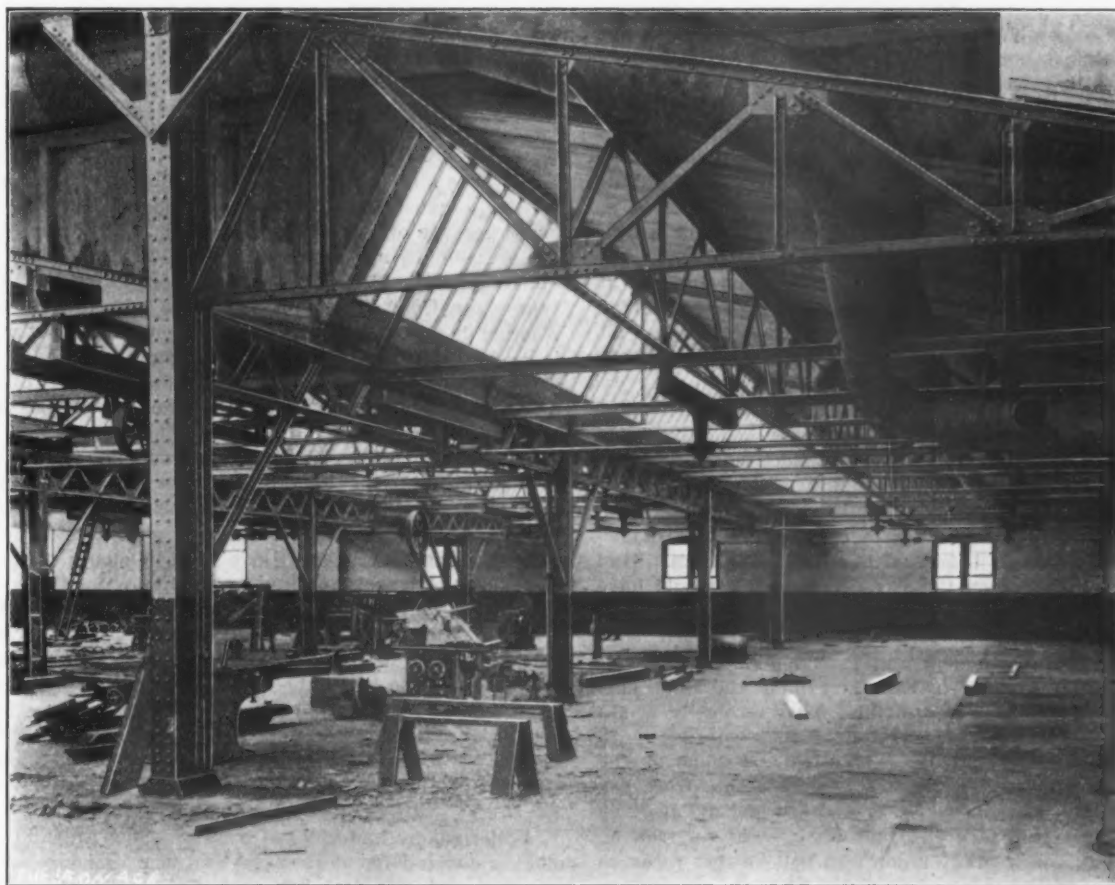


Fig. 8.—Small Tool Department.

THE NEW WORKS OF THE AMERICAN TURRET LATHE MFG. COMPANY.

the frame work is of steel; the roof planking is 3-inch yellow pine; the skylights are of heavy ribbed glass set in metallic sash; the floor is of concrete, and the construction throughout is first class in every particular. The building covers about 60,000 square feet of floor space, and cost, including 1200 feet of crane runway,  $\frac{3}{4}$  mile of sewers, 80.2 cents per square foot, distributed as follows:

	Cents.
Steel work, per square foot.....	33.7
Floor, 6 inches concrete.....	11.5
Foundations and brick work.....	10.3
Lumber.....	14
Painting.....	1.1
Roof covering.....	1.1
Sewerage.....	2
Miscellaneous.....	6.5
Total cost per square foot.....	80.2

crossheads of marine engines are usually of the slipper type, so-called, having a large rectangular face upon one guide only, some 18 inches wide by 24 inches long in large engines. These guides are formed by one leg of the frame, with an adjustable guide proper bolted on. Water circulates through the frame leg, but in spite of this the guides get so hot that they emit sparks and are even a dull red under severe stress. An oiler stands by with a swab and grease to slush them at every stroke, but they are very stubborn—the bearings are. Somebody has observed that an oiler's idea of a dangerously hot bearing is one that will ignite waste when held against it on the end of a stick, and this may easily happen now and again.

## Labor Matters in New England.

### The Machinists.

WORCESTER, MASS., April 25, 1903.—The labor situation among the iron and steel industries of New England, while not without its uneasiness, is very much less menacing than it has been in the spring for several years past. There is nothing to indicate that the machinists will go to any extreme, anywhere; in fact, with the exception of the old trouble at Rutland, Vt., which has never been formally settled, though the manufacturers are doing business as usual, it is not believed that there is the slightest inclination to do more than make quiet attempts to get better wages and the nine-hour day, and even these attempts will be the exception. Worcester is a good example of the prevailing conditions among the machinists. A year ago at this time everything indicated the strike that came soon after May 1, centered in the shops of the Prentice Bros. Company and the F. E. Reed Company. This year the union will do nothing. Its strength has disappeared—that is, whatever strength it ever had. The present membership is hardly one-third of what it was previous to the strike last spring. In other cities and towns of New England the feeling is not at all antagonistic, at any rate to the extent of serious disagreement between employer and employee.

### The Molders.

The only signs of trouble come from the molders. While this is not universal it is pretty general in some parts of New England. Demands or, as they are more politely termed, requests for a higher minimum wage and a shorter day have been made in various places, among them Providence, Springfield and Fitchburg. A \$3 minimum is the general objective, and coupled with that is a demand for the union ratio of apprentices, an increase in the overtime rate, a decrease of an hour a day, which is generally from ten to nine hours, and in one or two instances from nine to eight hours; a rate to coremakers 25 cents less than that to molders, with full molders' pay where molders have done work on the job in hand; and, either stated outright or implied, a full recognition of the union.

While on the face of it the demands seem menacing, in reality they are not, according to the general opinion among the manufacturers. In every place where demands have been made the union molders are not united. It is generally believed that only a minority, and a small minority at that, are in favor of causing even small friction. The trouble began with outside agitators. Had they not appeared on the scene no demands would have been made anywhere. This may have its exceptions, but they are few. Your representative has talked with union men of Springfield and Providence, and they all told the same story. The rank and file of the union men are strongly opposed to a strike. They naturally would like more pay and shorter hours, and they point to the \$3 minimum rate in force in Worcester and some of the other New England cities, Worcester being cited because it is a city of general character and size not unlike their own cities. But they also say they want no trouble. They want work. Many union men believe that recourse to a strike would only end in weeks of idleness and then defeat, just as they have been defeated in Providence during the past 12 months. One of the union molders spoke with some bitterness of the outside agitators who have nothing to lose themselves by a strike and "who make a good living by getting other men to strike." Another significant fact is that the union meetings which voted to make the demands or requests were slimly attended as a rule, and hardly unanimous.

The manufacturers are making no answer to the demands. They are not in the mood to make concessions under pressure, no matter how slight the pressure may be. In a few instances in New England concessions have been made before demands were made. One such example is that of the New England Butt Company of Providence, who made a 56-hour week for their molders. Another is the Wason Mfg. Company of Springfield, who several weeks ago made a nine-hour day through their shops, affecting 525 men, including a considerable num-

ber of machinists and molders. Undoubtedly there are other such instances. In Springfield conditions are more or less affected by the presence of the United States Arsenal, where the eight-hour day is in force under act of Congress.

Whatever serious trouble there may be among the molders will be local. For several years there have been molders' strikes in New England. The union is pretty strong. But the confident prediction is that this season will see fewer strikes among this class of labor than for some time past.

The real trouble among New England iron and steel manufacturers is not so much on account of their own men, but because of the attitude taken by men of other trades. Business generally is affected by such troubles as those at Lowell and the shoe towns, such as Lynn. This does not count at the present time, because there are orders enough on every one's books to keep shops running full.

The condition of the building trades is really serious in some cases, as is demonstrated by the case of the Fitchburg boiler builder, who has given up building a large modern machine shop, and one of the largest machine tool builders of Worcester, who has abandoned his plan of erecting a large addition to his shops. These concerns did not dare to begin building operations when the chances seemed to be that everything would be hung up in the air by a strike of the building trades.

### The Demand for Machinists.

The demand for machinists in New England is tremendous. Occasionally one sees the sign, "Machinists Wanted," at the door of the office of a shop superintendent, instead of the usual "No Help Wanted." Men are employed without the searching questioning which generally goes with taking on a new hand, even in the largest shops. Instances of feeling engendered between concerns because of machinists going from one to the other are occasionally met with. Where new machine shops are starting business this feeling is almost universal. One reason for this is that business is so exceedingly good. Another is that the new supply of machinists is not what it used to be. Young men for all around work in a machine shop are harder and harder to find. This is due to a considerable extent to the antagonism of the Machinists' Union toward the old apprentice system.

One prominent manufacturer of machine tools made this statement the other day: "Take the ten brightest young men in New England, with the greatest aptitude toward mechanics, and tell them to go out and find a place to learn a trade and give them a month to do it, and means to travel, and nine out of the ten of them will come back and say no one would take them in." The result of this condition is that hardly one journeyman machinist in 50 is to be trusted on all classes of machine shop work. The helper becomes a lathe hand or planer hand. But the all round machinist is becoming a rare bird because the young men of New England are not given the chance which their fathers had of serving a genuine apprenticeship.

### Boilermakers.

Boilermakers and kindred trades in New England are making demand for more wages and shorter hours. The trouble is not universal, but most of the union shops will feel it, excepting such concerns as the Fore River Company of Quincy, Mass., where piece work prevails. The demand is for a 10 per cent. advance in wages and eight hours a day where work is done outside the company's works. The nine-hour rule prevails in all the shops and yards where the demand is made. In Boston the demand is pretty universal, and nearly all concerns throughout New England having marine work are affected, as well as some boiler concerns which have no work on shipping. The machinists and blacksmiths employed by the boiler manufacturers are making no demands.

In a German sugar refinery, where large quantities of coal were burned, a device to catch the soot was applied. At the end of a week the soot was removed and when weighed it amounted to 6700 pounds. What quantity of coal was burned during the week is not stated, but there must have been some poor firing, in any event.



### The American Refractories Company.

The following statement is taken from a prospectus just issued by the promoters of a new company seeking to effect another consolidation of fire brick interests:

It is proposed to incorporate the American Refractories Company under the laws of the State of Pennsylvania with corporate powers to acquire the properties of the several firms hereinafter named. They have been selected because of their advantageous location with reference to production, marketing of product, shipping facilities and freight rates. The major number of the plants are located within the State of Pennsylvania, and the properties are located in the districts famed for the finest raw materials for the making of refractory products, and the same is true of the plants located in Maryland, West Virginia, Illinois, Ohio and Kentucky.

The properties include 34 companies and firms, having 51 plants and an acreage of 20,798 acres owned in fee and 17,599 acres under lease and on royalty, on which the royalty in any case does not exceed 15 cents per ton; in most of the leases much less royalty. The equipment of the company in place and in operation, in part, consists of 63 main buildings, 57 engine and boiler buildings, 300 tenant houses, dwellings and 100 other buildings, 98 stock sheds, 34 blacksmith and carpenter shops, 13 sand houses, 37 office buildings, 16 oil houses, 10 store houses, 66 elevators, 87 dryer tunnels, 86 engines with 7728 horse-power, 101 boilers with 8980 horse-power, 30 crushers, 20 drums, 35 screens, 59 pumps, 5 bridges, 154 hand represses, 33 power represses, 54 dry pans, 58 wet pans, 160,000 pallets, 18 pug mills, 44 brick machines, 4 locomotives, 2804 cars, 61,016 feet standard track, 249,950 feet small track, 372 kilns, 19,037,000 kiln capacity, with the necessary small tools, utensils for the various equipment installed at the various plants now in operation. The daily capacity of the plants proposed to be taken over is 1,479,700 fire brick or equivalent in shapes, in addition to raw clay, raw stone, &c. It is estimated that there is a sufficient quantity of fire clay and silica in the properties to be acquired to provide material for the new corporation to carry on operations for the next 150 years at the present rate of production of all plants now being operated.

It is proposed to take over the plants and equipments of the following named individuals, concerns and corporations:

Reese Hammond Fire Brick Company.  
U. S. Enamelled Fire Brick Company.  
Hammond Berkly Company.  
Curwensville Fire Brick Company.  
Hammond Fire Brick Company.  
Jps. Solissor Fire Brick Company.  
Ashland Fire Brick Company.  
W. H. Wynn & Co.  
Sandy Ridge Fire Brick Company.  
Queens Run Fire Brick Company.  
Renovo Fire Brick Company.  
Pennsylvania Fire Brick Company.  
South Fork Fire Brick Company.  
Citimax Fire Brick Company.  
Olive Hill Fire Brick Company.  
Elk Fire Brick Company.  
Gardner Bros.  
Savage Hill Fire Brick Company.  
Dunbar Fire Brick Company.  
T. B. Palmer.  
Stuart Fire Brick Company.  
Savage Fire Brick Company.  
Mt. Union Silica Brick Company.  
Garfield Fire Clay Company.  
Niles Fire Brick Company.  
West Branch Fire Brick Company.  
Davis Fire Brick Company.  
Ohio Fire Brick Company.  
Welch Fire Brick Company.  
Welch-Gloninger & Maxwell.  
Scioto Fire Brick Company.  
Dover Fire Brick Company.  
Chicago Retort & Fire Brick Company.  
J. V. Rose & Son.

These properties, including all the necessary expenses of organization, are to be acquired by the new company at a price not in excess of \$11,000,000. It is proposed that the new company will have a capital of \$20,000,000, which shall consist of \$4,000,000 first mortgage 30-year 5 per cent. gold bonds (the mortgage to secure the pay-

ment of the same to provide for sinking fund sufficient to retire the bonds at maturity or maintain intact the acreage with which the company begin business), \$8,000,000 of preferred stock, which shall be entitled to 7 per cent. annual accumulative dividends, without participation with the common stock in the division of any further surplus or profits, and \$8,000,000 of common stock.

The properties to be taken over have been appraised upon the basis of their intrinsic value and their earning capacities, and upon audit of the books of the various concerns above named it has been ascertained that their profits for the year ending December 31, 1902 (in many cases the average of several years' earnings) have been a little more than \$925,956.98, with all operating expenses and fixed charges of every kind deducted. In many cases a comparatively small expense in building extra kilns, additional dry floors or the placing of another pan would greatly increase the output.

On the basis of \$925,956.98 per annum net earnings as established by past experience, and deducting therefrom \$2,000,000 for interest on the bonds and \$490,000 for the 7 per cent. on \$7,000,000 preferred stock, there remains \$235,956.98 per annum for dividends upon common stock issued and sinking fund purposes exclusive of any increase in net earnings which may result from the consolidation of the concerns above named and their operation by the new corporation. It is estimated that the economies and natural increase in production and demand arising from the operation of the consolidated properties will increase the net earnings above stated at least 40 per cent. immediately. Since the closing of books for 1902 the earnings as shown by auditor's statement show that the increase this year is 40 per cent. over that of 1902. Of the capitalization it is proposed to leave unissued in the treasury for the purpose of future acquisition of properties, &c., \$1,000,000 of preferred stock and \$1,000,000 of common stock.

The directory at the commencement of the company's operation will be selected from the above named companies, together with others whose influence in a financial way and otherwise will be deemed advisable. The bonds and preferred stock of the company are offered for subscription at par, each subscriber to be entitled to 70 per cent. of his preferred stock subscription in full paid common stock of the new corporation. The subscription of underwriting agreement will be under the control of the Colonial Trust Company of Pittsburgh, Pa., who have been named Syndicate Manager.

### The American Foundrymen's Association.

Active preparations are being made for the annual convention of the American Foundrymen's Association, which is to be held in Milwaukee, Wis., on June 9, 10 and 11. The following is a list of the committees thus far appointed:

Executive Committee, consisting of chairmen of all subcommittees—S. W. Watkins, chairman; C. E. Sammond, Irving Reynolds, E. N. Dickson, A. W. Bair.

Reception Committee—A. W. Bair, chairman; T. J. Neacy, W. J. Turner, Irving Reynolds, W. J. Adams, Harry Bayley, F. W. Siver, H. F. Crandall, F. M. Prescott, Otto Falk, B. Kaveledge, V. Nortman, Professor Johnson, A. J. Lindemann, O. W. Greenslade, C. A. Sercomb.

Committee on Halls, Hotels and Carriages—E. N. Dickson, C. A. Maynard, W. J. Turner, S. Knox, R. J. Schwab, T. W. Sheriffs.

Entertainment Committee—C. E. Sammond, G. H. Smith, W. L. Douglas, H. B. Goodrich, J. O. Bradley, F. W. Siver.

Finance Committee—S. W. Watkins, W. J. Read, E. N. Dickson, A. J. Lindemann, O. W. Greenslade, Theo. Vilter, W. H. Osborne.

Press Committee—Irving Reynolds, B. Hoffman, R. J. Watrous, Citizens' Business League; R. S. McPherrin, H. W. Bolens, A. I. Findley, *Iron Trade Review*; C. Kirchhoff, *The Iron Age*; J. A. Penton, National Foundrymen's Association; Henry Hansen, *The Foundry*; J. H. Pepper, *Brass Founder and Finisher*; H. E. Field, Dr. Richard Moldenke, American Foundrymen's Association.

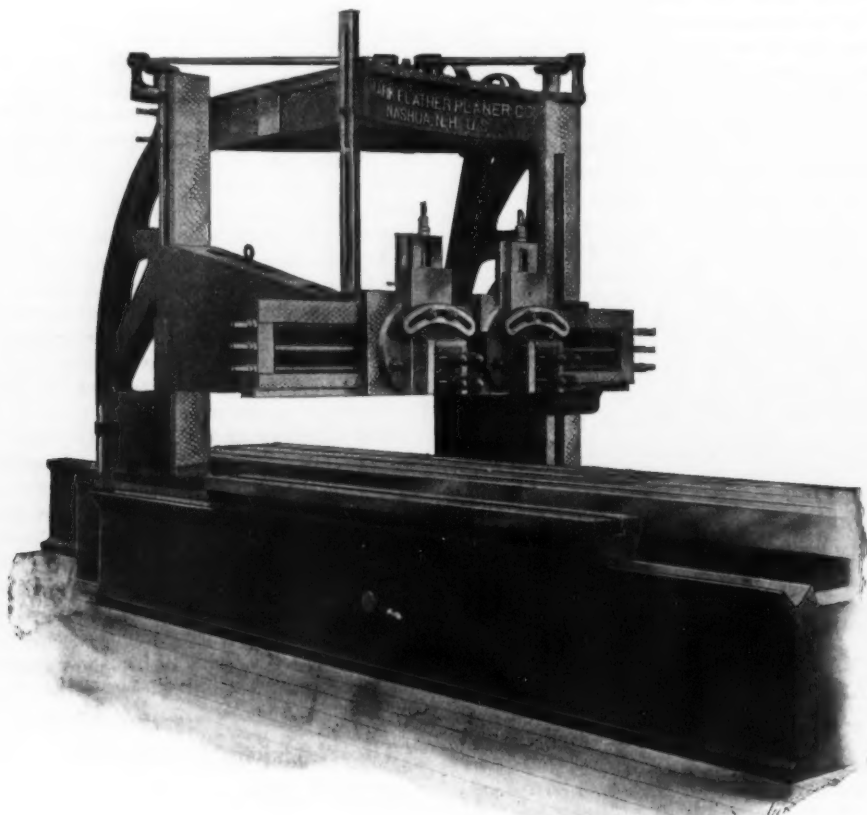
### The Flather Combination Planer.

The Mark Flather Planer Company of Nashua, N. H., have added to their line of metal planers a combined standard and open side planer, intended for shops where there is occasional use for an open side machine, but not enough use to warrant the purchase of a planer of that type. The planer is shown in the accompanying engravings and in the drawings, giving side and top views of the power elevation mechanism. The planer shown is a 42-inch machine.

When the far housing is brought forward the planer may be used like any standard machine. The cut, Fig. 1, shows the far housing moved back, an extension piece being placed between the cross rail and the face of the housing, and a supplementary table being in position. In this planer, with the extension piece in place, the distance from the point of the tool to the face of the

fastened to the extension, and is made in such a way that the alignment of the rail is not changed. The rail cut out is made to fit over the face and both edges of the near housing, and is extended above and below the regular width of the cross rail, giving to it greater bearing and support, so that when the far housing is removed the rail will still be held rigidly in position. The reversing mechanism may be operated from either side of the planer by hand, and by shipper dogs in front. The change from a standard planer to an open side one, or *vice versa*, may be made in a very few minutes.

The power raising attachment for the cross rail, as shown in the drawing, Fig. 2, is driven by two friction pulleys, similar to those on a lathe countershaft. The bevel pinion on this shaft drives a double bevel gear in a central position on the tie which connects the two housings. The lower and larger gear is driven by the pinion on the countershaft. The upper drives two cross



THE FLATHER COMBINATION PLANER.

housing is 63 inches, so that a piece over 5 feet wide can be planed. The cross rail being the regular standard for the 42-inch planer, with two heads on the rail, is long enough to square down work 63 inches wide with the far head, and if the head is placed on an angle several inches wider can be planed.

The supplementary table to support the work slides easily in a V-way, scraped to a fit, giving a secure outer support to which work can be bolted, or a rolling table can be furnished if preferred. The far housing is tongued into the top of the bed, the cheek of which is made long enough to enable the housing to be moved back the required distance by means of a rack and pinion, so that the extension may be put in position. It is bolted to the cross rail and housing, making a rigid support for the rail. The face of the extension is exactly like that of the housing and is fastened to the rail by the same means as is the housing when the latter is in place to make the machine a standard planer. The back of the extension is made to fit over the two edges of the housing as well as to the face. In changing from the standard position to the open side position the nut on this raising screw is disconnected from the rail and

shafts. One of these shafts is rigidly connected with the near housing, the other is connected with the far housing, the latter shaft and bevel gear being made to swivel around the central driving gear and also on the bevel gear on the raising screw on the far housing. The shaft also telescopes through the bevel gear, so that in moving the housing from one position to another the shaft is free to slide through the gear as it moves about the circle of the central gear. As these gears revolve around the central gear, so the bevel pinions revolve around the driving gear and also the bevel gear on the screw.

The driving gears are all contained inside the bed, which is double webbed around the gears, making a very stiff and powerful arrangement for driving the table. There are no cap boxes to work loose, the beds being bored out in perfect alignment and the bearings being bushed with bronze gun metal.

The feeding mechanism for the heads is driven by a new relief friction, which the company have recently brought out. It is positive in its action in moving feeds, but when released takes no power. The reversing motion provides for one belt doing its work and then



leaving the pulley before the other starts, thereby preventing the squealing of belts.

### Industrial Notes from Mexico.

DURANGO, April 20, 1903.—The State Government of Chihuahua has granted a 99-year franchise to the El Paso, Texas, Electric Railway Company for the operation and maintenance of an electric street railway system in the city of Quarez, Mexico. The concession has to be ratified by the Federal authorities before it becomes effective.

The Monterey glass bottle factory is to be enlarged. A department for the manufacture of window glass will be added, and the existing facilities for making bottles will be increased. The glass blowers are German, but an attempt is being made by the company owning the plant to train natives to the work.

importing coal in large quantities from the Pocahontas fields of Virginia for their shops at San Luis Potosi.

An order for pumps was recently placed with the Morris Machine Works of Baldwinsville, N. Y., by a Mexican concern.

An order for freight cars has been placed with Wigham & Magor of New York City by the Velardeña Mining & Smelting Company.

It is reported in the capital that a Mexican syndicate will construct an extensive aluminum smelting plant, to be operated by water power. The prospective enterprise will probably be situated in the State of Jalisco, if it materializes at all.

A new custom house is to be established at Las Vacas, in the State of Coahuila, on the Rio Grande frontier.

A concession has been obtained by a native resident of Chihuahua for the establishment of a fire brick and crucible plant in that city, in which enterprise \$20,000 must be invested.

A French society in the capital, with the title of the

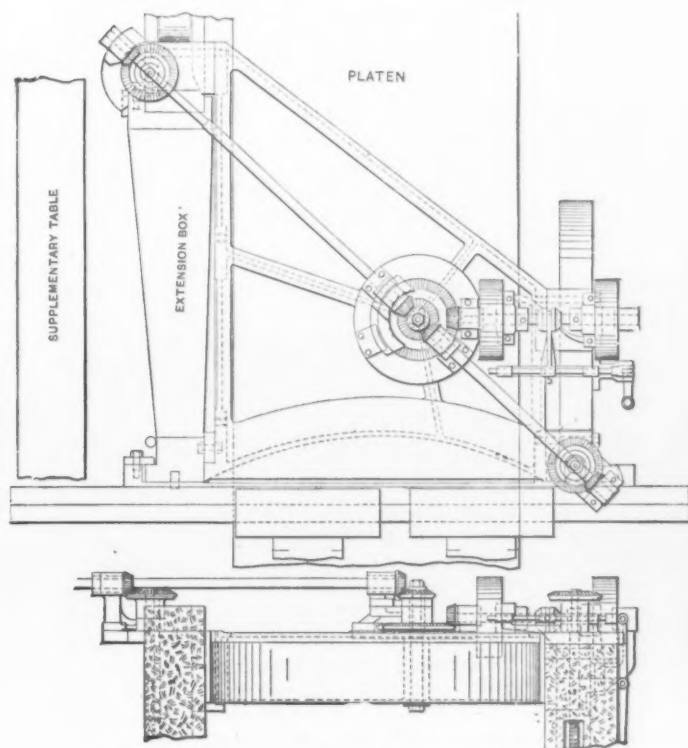


Fig. 2.—Power Raising Attachment for the Cross Rail.

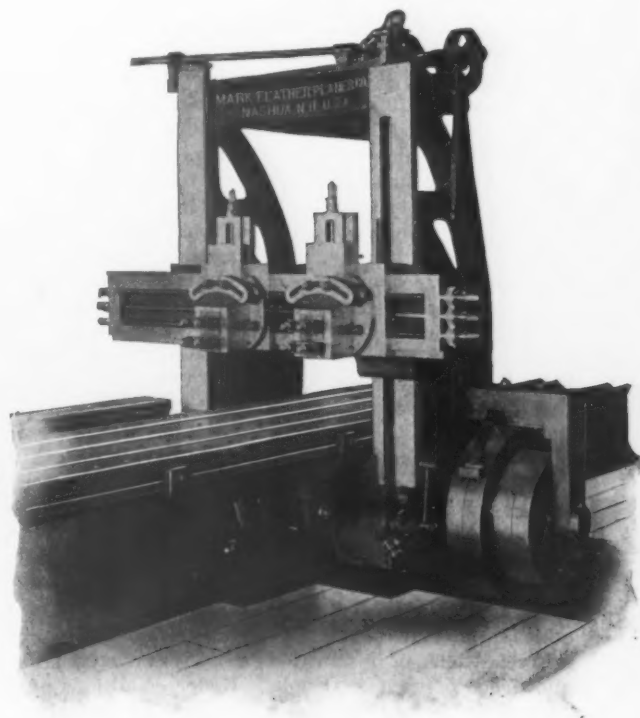


Fig. 3.—Arranged as Standard Planer.

### THE FLATHER COMBINATION PLANER.

Col. A. W. Woodford, who is interested in the petroleum oil wells of West Virginia, has been traveling in Mexico. Speaking of the operations of the Mexican Petroleum Company, who are operating at Ebano, near Tampico, he declares that they expect to supply the City of Mexico "with an abundance of oil for fuel purposes." The president of the company referred to reports great progress in the matter of plant construction and storage provision. The total tank capacity is about 125,000 barrels. A refinery of five stills and five coolers, with an estimated capacity of 12,000 barrels of oil per day, is in the course of construction. The assertion is made that the wells now produce a combined product of 600 barrels daily. Three drilling rigs are in operation.

John J. Moylan, the railway contractor, who recently made a prospecting trip through the State of Guerrero, is said to have discovered an iron ore deposit of extraordinary magnitude.

Orders have been placed by City of Mexico supply houses for gas and gasoline engines with the Webb Gas & Gasoline Engine Company of Kansas City, Mo., and also with Fairbanks, Morse & Co. of St. Louis, Mo.

As an indication of the handicap which Mexican industries suffer from the lack of a fuel supply, it may be noticed that the Mexican Central Railway Company are

*Sociedad de Exportadores*, is actively engaged in fostering trade relations between this country and France. The society recommends French exporters to imitate the methods of United States manufacturers, to "boom" their products, and to "offer them under as advantageous conditions as possible."

Among other shipments from the United States to Mexico last month were: From the American Steel & Wire Company, 115 tons of wire, and from the National Tube Company, 1300 tons of iron pipe. Recent orders placed include one for 47,500 tons of 75-pound steel rails and fastenings, with Justice Cox, Jr., & Co. of Philadelphia, for delivery within a year, and one with the Gelser Mfg. Company of Waynesboro, Pa., for four traction engines.

J. J. D.

It is interesting to note that in an effort to comply with the Chicago ordinance against smoking stacks the Chicago and Great Lakes Dredge & Dock Company have been making experiments with a so-called smoke consuming device. One device patented by Wm. Summers of Chicago has been tested on the tugboat "Harry C. Lydon," and is claimed to have given satisfactory service, and preparations are being made to equip the "Andrew H. Green" with the same device.

## Modern Industrial Progress a Social Problem.\*

BY CARROLL D. WRIGHT.

When a man is working for a wage that simply provides food, raiment and shelter in sufficient quantities to keep the physical machine in practical working order and without depreciation, it is natural and just and reasonable, if he be an intelligent artisan, to demand something beyond this, something that will enable him to become what all wish him to become, an active factor in society for society's good—to become a social and political factor. He demands something beyond mere subsistence in order that he may render more efficient social service and secure that culture which will enable him to educate his family and surround himself and them with some of the things that elevate; in other words, it is reasonable and just that he should desire a higher standard of living. This demand is recognized by all just employers, and especially by those who see in modern industry the basis of social development. No employer who is himself seeking the increase of his income can reject it as unreasonable or unjust.

Nevertheless, the demand cannot always be granted. It is then that difficulty arises. When this demand cannot be granted it is the bounden duty of the employer, who is at the same time demanding of the community in a larger sense just what the employee is demanding, to give the latter intelligent, reasonable and fair explanation why the demand cannot be granted, for it is the right of the laborer, when his remuneration is reduced or below an amount which will give a fair standard of living, to know why, just as much as it is the right of the stockholder to know why his dividends are reduced or are not increased, for each has invested something of value to himself in the common enterprise. Whenever employers take this course harmony, peace and financial success are the usual results. Nor is there anything experimental in all this, for wherever these precepts have been put into practice the most beneficent results have been secured. I need not relate instances. They will occur to you all, you who have had such large experience in the management of industries and in the employment of men.

The hope for industrial prosperity is to be found in these principles. Men always wish to know why, and ethics insist that the answer shall be given. Ignorance of the conditions of production must be overcome with knowledge of such conditions. Under conditions of production at the present time the amount of capital necessary for the production of a given unit is greater than at any previous period; wages on the whole, barring temporary disturbances, are higher, the constant tendency over any long period being upward, while the profit to capital is smaller and the cost of the unit to the consumer is less. This statement is an economic axiom, and while there may here and there be exceptions to it, it is the rule of industry. This being the case, wages cannot be rapidly increased. They may be raised now and then by some artificial force, or depressed on account of some artificial condition, but they always seek their economic level.

### Economic Laws Govern Profits and Wages.

Capital may receive now and then an exorbitant increase in the way of profits or of interest and wages may be raised or depressed artificially, but under all normal conditions the profits to capital and the remuneration to labor will be regulated by positive economic laws; but these laws are more elastic than natural laws, and hence disturbances, misunderstandings and bitterness arise. On the whole, however, the remuneration to capital is constantly decreasing and that to labor constantly increasing. This is the result, so far as capital is concerned, of the accumulation of wealth which may be turned into active and productive capital, and so far as wages are concerned, to the increased standard of living resulting from education and the culture which follows it.

Of course, in dealing with these principles we have

nothing to do with speculative conditions, but their working out depends upon the finest mental conception; for leadership is a necessity in industry as in all other lines, and to leadership must we look for the development of social conditions as a corollary of the development of industrial conditions. With intelligent leadership there is success. But leadership in industry sometimes begets the desire for leadership in politics, and then, if the leaders have no conscience, they will seize upon labor strifes or differences as a pretext to secure power, and to secure such power we are told sometimes that certain actions must be taken to prevent strife and industrial war. Such a position lowers the social force not only of capital, but of labor.

Probably there is no war, either industrial or political, in our immediate future. Politically we have no great questions which agitate our people as they do the European countries. We have no vital questions before us which mean to us what the vital questions of European politics mean to the people of Europe. Our questions, so far as magnitude is concerned, belong to the economic development of the resources of our country. Our future must be a continuance of the contests with nature. The great questions for us to meet grow out of industrial relations and interests. Notwithstanding this, our industrial problems may well excite at times the anxiety of conservative and patriotic men, for upon their treatment depends the peace of the country to some extent, and it may be of the industrial world. So our very best services must be called to the social and economic contests of our epoch.

I need not urge in this presence the necessity of every man, whether he be employer or artisan, exerting his influence in the interest of all movements which tend not only to elevate labor, but to teach the world the necessity of the full recognition of the utter worthlessness of capital until intelligent labor vitalizes the machinery it sets in motion. The application of such principles has a twofold action; it complicates the relationship as to rights, duties and privileges, but it helps more to solve some of the phases of what we call "the labor question," and such phases can be solved only under the *régime* of the aristocracy of brains, which aristocracy must be made up from the very best minds of all the parties engaged in industry. This aristocracy will solve vexed questions whenever they must be solved. It is true that such problems cannot be fully solved now, for the very questions which make the system of competition a necessity prevent solutions. These conditions are conditions of ignorance, but they are giving way and intelligent conditions are taking their place, and such intelligence will lead to a softening of present struggles when capital is ready, as it ought to be in this body, to associate itself with labor on an honorable basis as its fellow and labor is intelligent enough to accept the fellowship.

### Improvement of Workmen Under the Factory System.

When we compare the modern system of industry with that which preceded it, looking only to results which are not represented by figures, the marvel is as great as when we consider the statistics. Under the old system of hand labor the workingman was a clod, ignorant, debased, without social force, and having no relation even, or at least little relation, to the social condition which surrounded him. The inventions which led to the establishment of the factory system changed all this gradually but rapidly. It changed ignorance and poverty to intelligence and well being; it led directly to the establishment of the national school system of England; it played its part in the interpretation of laws, and more strongly in the enactment of laws for the welfare of the wage worker. Under it care has been taken for the sanitary and hygienic conditions of the worker everywhere. To it can be traced the establishment of great educational institutions. The production of art in a way to supply all the world is one of the direct effects of the modern system. All these things are the direct results of the gradual development of modern industry, by which all men may secure the commodities necessary for a comfortable existence at reasonable cost.

The intelligence which comes from the friction of the modern industrial establishment is sufficient to justify

\* Extracts from an address before the National Association of Manufacturers, New Orleans, La., April 15, 1903.



its existence. It is sometimes alleged—and frequently, indeed—that the complete modern establishment for the production of any class of goods has created an ignorant community. There is nothing more absurdly false than this position. The great establishment or the industrial community may bring together, perhaps, a body of ignorant men and women, but it does not create the ignorance. By bringing them together the community sees that something must be done to improve the masses employed, and thus the workingman has risen from ignorance to intelligence, and as he has reached intelligence he has become more or less a greater complication in industrial affairs. In his ignorance he did not strike; in his intelligence he does strike. The next step in the development of his intelligence will be that he will not strike; that he will be able to accommodate himself to conditions, because he will know them and understand them better. He will be able to recognize his rights in relation to the rights of others, and to know fully what is necessary for successful production, where now he understands only a part.

A little learning is a dangerous thing; a little intelligence means difficulty. If you are dealing with an intelligent man you must recognize his rights. If you are dealing with an ignorant man you may get along peacefully without recognizing his rights; but your action toward the ignorant man is a brutal one, while your action toward the intelligent man is an intelligent one. This intelligence means further complication, but out of it will grow a better condition, a better feeling and a truer relation of the man who represents capital and the man who represents labor. This means, of course, the organization, the continuance, the perfection of labor unions.

#### Capital and Labor Must Get On Together.

Some of the methods of the labor unions are damnable. So are some of the methods of the capitalistic organization to be condemned, but because they cannot get on together does not mean that either or both should be destroyed. They must get on together. That is the necessity of the time, and it is to the intelligence of the leaders of both interests that society at large looks for the development of industry on a basis of social progress.

It is interesting to study the development along individual lines—I mean as relating to individual industries or individual elements of society, not individuals as persons. I will give you only one illustration to show what industry, through organized capital and organized labor, has accomplished, and you will all recognize it. You remember the railroad man of 25 or 30 or 40 years ago. Our fathers told us we must not associate with him—that he was a tough. What is he to-day? Through the discipline and management of our great railroads, through the discipline of the leaders of our railroad brotherhoods, the railroad men throughout the country are among the most temperate, the most orderly and the best citizens in the community in which they live. This illustration must suffice for others, but it is true, and it emphasizes what can be done when the two sides of a great enterprise join together to secure results which shall be beneficial to both.

In some of these things we may find a basis of sentiment. Sentiment is all right, but it must be practical sentiment. Charity is all right, but it must be discreetly applied, or it is a harm. Neither sentiment nor charity can amount to anything in any community without the very best business methods behind it, and the best business methods are to be developed by the association of capital and labor in business relations. I believe that in the near future all industries will be organized on the two sides of labor and capital for the purpose of securing the best possible conduct of the business itself, each looking to the welfare of the other.

The principles which I have outlined do not belong essentially to the altruistic spirit of the present day, nor are they the result of the study of industrial conditions from the doctrinaire point of view. They were easily applicable under the old relationship of manufacturer and artisan, when individual association prevailed, but to-day, with the great corporation as the employer and thousands of men constituting the body of employees, the

practical application is more difficult, and herein, it seems to me, lies one of the essential phases of the problem, How shall the old ethical, personal relations have force in the new corporate relations? The attempt to accomplish this desirable result has not been free from difficulties and even strifes. As we have seen, organization leads to organization. The manager of a great corporation sometimes refuses to deal with a committee of men employed by it, on the ground that he can deal only with the individual when differences arise. He forgets in this that he is the representative only of hundreds or maybe thousands of stockholders, and that it would be just as reasonable for the committee of the employees to insist upon dealing with each individual stockholder as with the manager. To overcome the strained relations which result from the insistence upon an impossibility by either party, each must deal with the other through representatives, and then the principles of this address find easy application.

#### The Boycott as Old as Human Nature.

It has been very natural in these attempts that the representatives of one of the elements in production and of industry generally should imitate the methods of the other. The boycott is as old as human nature, and it is applied by all people, by all parties, and by all organizations, the application of it being only one of degree. The workmen's union uses it; the employers' association uses it. It is one of the secretly recognized forces of society. Whether it exists in the form of an association to induce its members to trade with only a certain class of dealers, or of a union to prevent the consumption of beer manufactured by a company that does not obey the union's rules, or an association of railroads which seeks by it to divert shipping from one line to another, it is all one and the same thing, and whenever applied interferes with the individual freedom which must be preserved in order to secure the perpetuity of our own free institutions.

The blacklist is only a form of boycott. Everybody boycotts somebody, and to a certain degree it is a legitimate weapon for the defense or protection of proper methods. Carried to the extreme, it is a crime against the individual and prevents that development of private character which is essential to public virtue. It never does, therefore, for either the employer or the employee to accuse the other of resorting to methods common to both.

But with the existence of confidence—I may say, with a restoration of confidence—which grows out of manly treatment, all these objectionable methods, even under the present organization of industry, will cease, and there will be no more difficulty in applying such principles than under the old personal relationship.

The popular notion that the corporation has no soul relates purely and solely to the fact that its powers are exercised and its duties performed by representatives, and not by individual investors; but there is no more reason why a corporation should exist without soul than that the individual should. It all depends upon the character of the men, individually, who constitute the management. Of course, the corporation cannot die, as can the man. The corporation is not limited by human powers; sickness and death do not defeat its purpose. This gives it strength and perpetuity, and the capacity, when accident occurs to any individual, to go on without interruption. This ought also to guide the power to deal justly with all concerned.

Individual selfishness ought to be excluded from corporate action. The same remark applies to the labor union; the men who administer its affairs should be moral men, just men—not men seeking individual advantage, but men seeking the good of the whole—and then, when they come into association with the men who represent the employers, there should be no difficulty in recognizing just principles and reasonable actions. I have no sympathy with the doctrine that, under the corporation, there can be no moral relationship between employer and employees. It is a vicious doctrine that such relationship cannot exist. We are often led astray, when considering industry either from a purely economic or from a philosophical point of view, by a misunderstanding as to the



true nature of capital. To set ourselves right we must understand that capital is not wealth—dollars and money invested; that it includes everything necessary for production—the tools of industry, the means for the payment of services, for the purchase of materials—the whole plant, in fact, and the labor of an establishment constitute its capital. Nor does it matter to society who owns this force. The great question for society is: Is this force actively and productively employed and employed economically?

#### Capital Is Labor.

The savings banks of the country contribute to the productive capital of industry; the small means of thousands of individuals become the aggregated capital of a great corporation, and through the logical development of the working powers of the individual man.

The first man to use a stick or a cudgel or an implement of the crudest possible form was the first capitalist. The moment he had something besides his hands with which to help his work, however primitive it may have been, then the capitalist was born, and each man seeks to be a capitalist, and is one. There can be, therefore, in the nature of things, and under a true philosophical consideration of them, no antagonism between capital and labor, for capital is labor. There should be no antagonism between the representatives of capital and the representatives of labor; and whether the representatives are the owners or not makes no difference to the problem nor to society. The absolute necessity, therefore, of a complete knowledge of the conditions of production and of the confidence which comes through a common venture is easily seen. There is weakness in individual effort, there is strength in association; and modern industry is strong because it is the result of associated interests. It would be a sad result of such association to have the representatives of the various interests living in constant, irritating warfare. There is no sense in such warfare, and there is no necessity for it. The welfare of society depends upon the stability of industry, and the stability of industry depends upon the moral sense which enters into its conduct. With a proper recognition of these principles there can be no failure; there are always strife and disturbance of the community and interference of trade when they are not recognized. The manufacturer and the artisan, in the final analysis, are one and the same; they are only different names for the different phases of the one great power which centers in the individual—the power of association through the exercise of moral attributes—and it is this power which makes for social development and which constitutes industry, the greatest of social forces, for organized industry always reaches down and lifts the lowly to a higher plane. The great question, therefore, for employers and employees is: Will they, in the conduct of their mutual affairs, excite the militant spirit, or invoke that peaceful consideration which leads to the adoption of the highest elements of business interests?

**A Modern Power House.**—The largest power house in Buffalo, N. Y., is now being completed by the Larkin Soap Company of that city. It is a fire proof structure of steel, brick and concrete, 120 x 256 feet, with a stack 250 feet high and an internal diameter of 14 feet. Twenty 500 horse-power boilers will be installed, giving a total capacity of 10,000 horse-power. The boilers are standard water tube boilers, and their furnaces will be equipped with Murphy automatic stokers and the latest coal and ash handling devices. The Larkin factories are being completely equipped to be driven entirely by electricity; the three-phase alternating current system, operating induction motors, having been adopted. To furnish power for this system two 300-kw. Westinghouse generators are to be installed in the new power house, each direct connected to a 450 horse-power McIntosh & Seymour engine, provisions being made for enlarging this installation as the demand for power increases. In addition there will be three 115-kw. American Ball generators, each direct connected to 150 horse-power engines of the same stroke, and one 50-kw. Westinghouse generator direct connected to a 75 horse-power Ameri-

can Ball engine. These latter machines are all direct current and will be used exclusively for lighting the plant; the lighting and power systems being entirely separate. All of the engines are simple noncondensing engines, as the various mechanical operations of the works, boiling of soap kettles, distillation of glycerine, &c., permit the utilization of the exhaust steam to great advantage. There will, of course, be the auxiliary apparatus necessary to such a power station, feed pumps, blowers, feed water heaters, fire pumps, &c., the contracts for which have not been placed. The second floor of the structure will contain a repair shop equipped with modern lathes, drill presses, pipe threading machines, &c., for doing all the repair and minor construction work throughout the factories. A large bathroom, fitted with tub and shower baths, will be provided for the use of the employees in the engine and boiler rooms.

#### Foundrymen's Association of Cook County.

Active steps are being taken to organize the foundrymen of Chicago and vicinity under the name of the Foundrymen's Association of Cook County. At a meeting held on Friday night, April 24, the report of the committee, which had been previously appointed to draft a constitution and by-laws, was considered. The committee is as follows: Chairman, Z. T. Miller, M. & D. Range Company; Erastus Foote, Dearborn Foundry Company; George W. Pyott, Pyott Foundry Company; C. J. DeBerard, Tarrant Foundry Company, and James A. Brady, Hecla Iron Works.

The Iron Molders' Union having made a demand for \$3 per day and nine hours work to constitute a day, the local founders have appointed a Conference Committee to meet with a similar Conference Committee appointed by the union to consider the subject. A demand has also been made by the employees for \$2.75 per day for core makers and \$2.25 per day for chippers.

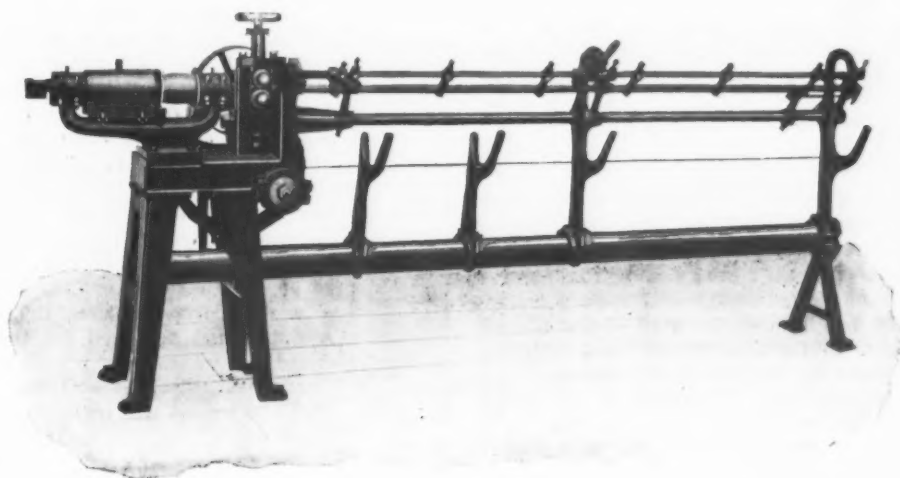
The local Conference Committee has been instructed to act in harmony with the National Founders' Association. The Conference Committee appointed to represent the local founders is as follows: Chairman, Philetus W. Gates, Jr., Allis-Chalmers Company; W. A. Jones, W. A. Jones Foundry & Machine Company; H. K. McLain, Link-Belt Machinery Company; A. Vanderkloot, South Halsted Street Iron Works, and Robert Vierling, Vierling, McDowell & Co.

**Chicago Traction Problem.**—The traction problem has again been the most prominent subject before the people of Chicago during the week. The placing of the affairs of the Union Traction Company in the hands of a receiver, while it improves the position of the company, as far as their internal affairs are concerned, does not alter their position in the controversy with the city administration. It will be remembered that Mayor Harrison insisted upon the traction company waiving all rights claimed under the 99-year franchise act, as well as the passage by the legislature of a municipal ownership act, before negotiations would be entered into for renewals of franchise. The demand that the claim be waived is upon its face absurd and could not possibly be granted by the companies interested, inasmuch as there are mortgages outstanding predicated on that claim. Notwithstanding the radically different positions assumed by the city and by the traction companies, both have been in favor of the Mueller bill, which has received such violent treatment at the hands of the legislature, or rather of the speaker of the house, during the past week. The traction companies, of course, are not in favor of municipal ownership, but the Mueller bill, it will be remembered, contains a provision for a 40-year franchise, thus giving both the Mayor and the traction company something which they consider desirable. It would seem that the next step in the controversy is a determination of the traction company's rights, if any, under the 99-year act, which has always been evaded by the city administration. With this question settled the city and traction companies will be prepared to negotiate on business principles. In the light of the internal affairs of the traction company it would seem that a reorganization is imperative.

### The Adt Automatic Wire Straightening and Cutting Machine.

The Adt automatic wire straightening and cutting machine, as perfected by the F. B. Shuster Company of New Haven, Conn., is here illustrated. All the parts are now made interchangeable and the arbor brackets are detachable from the body of the machine, thus securing, with the use of an extra arbor and bracket, the continuous running of the machine while the rebabbiting of an arbor is taking place. The arbor is provided with a detachable cover, with flanges on the sides of the pulley, which revolves in pockets containing waste. This waste is renewed from time to time, thus preventing the oil, grit and scale from working on the driving belts, as in the former machine. The arbor bracket is equipped with an oil box in which oily waste is placed and through which the wire passes before entering the straightener. The screws of the arbor bracket caps pass through the bracket and are checked by means of check nuts on the under side thereof, preventing them from loosening by reason of the high speed of the arbor. The feed rolls are made double width and double grooved, so that by reversing them a greater range of sizes of wire can be

and metric systems. A contribution to the Decimal Association of Great Britain was also voted, with a view to assisting the work of that organization, which is identical with that of the American Metrological Society. The Executive Committee was also directed to co-operate with the Decimal Association in every way possible, and to arrange for an exchange of publications. A number of interesting communications were received from prominent members of the society, making suggestions as to the work to be undertaken during the coming year. W. F. Allen, secretary of the American Railway Association, wrote as follows: "Permit me to suggest that too much should not be attempted in the way of legislation. I think it would be wiser now to endeavor to secure legislation which would provide that all new work for the Government should be planned upon the metric system. This might be followed by legislation requiring that all contracts with the Government, after a certain date, should be arranged in like manner." Nathan Appleton wrote in part as follows: "I do not believe anything of importance can be done until our Congress makes the metric system obligatory in the land. I happened to be in Germany when it became so there. They had a year or so to prepare and toward



THE ADT AUTOMATIC WIRE STRAIGHTENING AND CUTTING MACHINE.

fed with the same rolls. The friction on the cutting off shaft is of such construction as to give the greatest possible wear and the general design of the machine is such as to occupy less floor space than the old design machine.

### Working for the Metric System.

WASHINGTON, D. C., April 28, 1903.—The American Metrological Society held its annual meeting in the hall of Columbian University in this city on the 25th inst., the proceedings being devoted chiefly to an extended discussion of the best method of securing the early adoption by the United States of the metric system of weights and measures. Prof. A. L. Rotch of Blue Hill Observatory, presided in the absence of President Mendenhall. Prof. A. E. Kennelly was chosen president for the ensuing year, and Executive and Legislative committees were appointed to carry on the work of the society. Special committees were also appointed, as follows: To promote the metric system in the Government service on engineering, on manufactures, on textiles, on commerce, on primary and secondary schools, on higher education and on the press.

It was decided to make a special effort during the coming year to increase the membership of the society; and with this object in view it was determined that hereafter there should be but one class of members with nominal dues. The secretary of the society and the Executive Committee were authorized to recast the constitution in conformity with the action taken at this meeting. An appropriation was made for the purchase and distribution of rules marked in both the English

and the end of that time I saw in shop windows the familiar metric broadsides, and the people quickly learned the system, which any one can do in a half hour, while scarcely any one—I speak for myself—is familiar with the other complicated systems."

A letter was read from Director Melvil Dewey of the University of the State of New York, who said: "It gives me great pleasure to see evidences on all sides that the time is not far distant when we shall have a complete adoption. I am now having made a metric rule not only with inches on one side and centimeters on the other, as we have had for 25 years, but with both on the same face and brought together on a medial line for accurate comparison, so that workmen with either inches or centimeters in mind can translate mechanically by glancing at the metric stick. It is the best single tool I know to get people familiar with the measures."

The detailed plans of the society with regard to the legislation to be sought at the hands of Congress will be formulated by the Executive and Legislative committees during the Congressional recess. It is probable that the Shafroth bill, which was favorably reported from the House Committee on Coinage, Weights and Measures, during the Fifty-seventh Congress, will be recast with a view to making perfectly clear the fact that the system, if adopted by Congress, would not be obligatory upon private manufacturers, but would simply control Governmental transactions. Much opposition to the metric system which has been expressed in recent years has been based upon the supposition that the passage of the Shafroth bill would make the present system of weights and measures illegal and force manufacturers and others to adopt the metric system. The friends



of the bill have no such purpose and will doubtless modify it in such a manner as to make its object perfectly obvious.

W. L. C.

## Lake Iron Ore Matters.

### United States Survey Work.

DULUTH, MINN., April 25, 1903.—Prof. J. Morgan Clements, who has been in charge of the United States Geological Survey work on the Vermillion range and who has been with the Government in its survey operations for all of the Lake ranges with the single exception of the Gogebic, has been in Duluth the past week with proofs of maps and detailed sheets of the Vermillion monograph. The same large detailed sheets that were first published in the atlas of the Marquette iron bearing district will be published in the new monograph. There will be not only the general geological map and geological sections, but sheets on a very large scale giving all known outcroppings and the strike of the rock formation wherever exposed. The character of these lithographed sheets is shown by the fact that the engravers' bill for this work alone has been more than \$7000. The book will be in the continuation of the series of which there are now issued monographs on the Marquette, Penokee, Crystal Falls and Mesaba iron bearing districts, and which is to be completed by the Menominee district and a general summary. This issue will be out in about six weeks and due notice will be given through *The Iron Age* and elsewhere.

At the conclusion of the work now in hand Professor Clements will leave the Government service, and he has already resigned his professorship at Madison, Wis., and will open an engineering office in New York City. Madison loses, too, its professor of geology, Chas. R. Van Hise, who is very well known to all mining men of the lake region and who has been elected president of the university. President Van Hise has been on the staff of the United States Geological Survey for 20 years and since 1888 has been in charge of the Lake Superior work, certainly one of the most important divisions of the survey. Under his direct supervision the survey has issued all its monographs on the Lake Superior region.

### Charters.

The United States Steel Corporation have entered the market for shipping and are chartering vessels, until now there are more than 20,000,000 tons of ore chartered for lower lake delivery by all shippers, including what they will move in their own ships. The rates are as predicted in this correspondence, 85 cents from the head of Lake Superior, including Ashland; 75 cents from Marquette and 65 cents from Escanaba. This is considerably less than shippers demanded, especially as to Escanaba. The movement of ore to docks is free, especially from Minnesota mines, and roads will put their summer schedules into force in another week. Sales of ore are light as yet and may remain so until toward midsummer.

### Experiments with Titaniferous Ores.

Experiments with titaniferous ores, that have been noted in this correspondence, have been completed and some small pigs of a very hard, close grained pig iron have been made. The experimenters have been pleased to call these pigs "steel," probably because they are hard enough to take a polish, and whoever doubts this and expresses his doubts publicly is assailed as though he were a traitor to the Northwest. So far the so-called experiments have proved absolutely nothing and there is no hope in the minds of local persons acquainted to any extent with metallurgy that they will, at least so long as conducted as at present. The melting was carried on in a foundry cupola and some of the runs were half slag.

The Meteor, one time the Eclipse and later the Comet, has flashed for the last time and is being stripped of equipment. It has been in the hands of Corrigan, McKinney & Co. for some time and its prospects were considered good when they took hold. It was opened in 1886 and later was operated on a large scale by the Penokee & Gogebic Development Company, the Rockefeller company. It had been idle five years when the

most recent lessees took hold. The mine is located at Wakefield, on the eastern Gogebic.

Some curtailment of Marquette range operations has been carried out the past week, and several hundred men have been laid off at mines of the Oliver Iron Mining Company and Jones & Laughlins.

Several exploration companies have been formed on the Mesaba range for conducting contract work, the great demand for drills and the lack of competition making an opening for new concerns. These new firms will probably have little more than churn drill work for the present, at least. There is a great call on not only the Mesaba, but old ranges, for diamond drills, and it is a conservative estimate that a dozen more could be employed immediately on long and remunerative contracts if they could be had. It is not so much the lack of machines and carbons that causes the present congestion of drilling, but the shortage of competent drill runners and diamond setters. And it is this feature of the situation that makes it almost hopeless for any early solution. It is now recognized that no exploration can be successfully done unless preparations are made to carry it to considerable depth and into hard rock. Exploration by test-pitting is a thing of the past, this necessitating a drill for every hole sunk.

### Mesaba Mines.

At the new Burt open pit mine, Mesaba range, three shovels are being put into ore and it is expected that not far from 1,000,000 tons will be shipped this year. The mine was an underground property of small size until last fall, when stripping contracts were let, and now it is an immense proposition. Beside the three shovels in ore, as many are stripping. At the new Morris, which lies  $\frac{1}{2}$  mile to the east of the Burt, stripping has been carried on through the winter and a large tonnage will be taken this year. These are the largest of the many new shippers on the range, except the Stephens, which should make a very large shipment this season. It is splendidly equipped and arranged for turning out any required tonnage and its ore is of a most desirable character. It is expected that about 4,000,000 cubic yards of earth and other overburden will be moved this year from Mesaba open pit mines, and it is certain that there will be twice as many of this character of mines than in any previous year, while the proportionate tonnage won from them will be greater than ever. Fayal and Stevenson will be the leaders, as usual, with Mountain Iron and Mahoning following. The allotments of tonnage have not been announced here, not even to officers of two of the three transportation companies, who are going on the theory that they will about duplicate their 1902 business.

On the Marquette range the Mary Charlotte Iron Company are advertising for bids for stripping and are building an engine house. Near the shaft, which is now down 100 feet, drill holes are going down. In all 18 holes have been put down on the Breitung land lately and machines will be kept busy all summer, as the whole tract is to be thoroughly explored. The shaft of the Breitung hematite mine, the same ownership, is down better than 100 feet and five drifts are under way, one of them in ore of good quality.

Prof. A. H. Chester, who died at New Brunswick, N. J., a few days ago, was one of the early discoverers of the Minnesota ore fields, having been sent to the Mesaba range in 1875, when G. C. Stone first desired to interest Charlemagne Tower in the ore lands of Northern Minnesota. He then went to the eastern Mesaba and could see nothing desirable in it, and, by the way, no one has been able to find anything there to this day. While there he was led to investigate the Vermillion lake outcroppings and the Duluth & Iron Range road was the result, with all the tremendous train of consequences the construction of the first road to the northern fields brought about. When these consequences are considered the reports of Professor Chester, bringing about the opening of that wilderness, were of more importance than many a great war.

D. E. W.

**Information Wanted.**—A correspondent wishes to learn of manufacturers of ball bearing rollers used on the sill of the charging door of open hearth furnaces.



## Industrial Notes from Scotland.

### Iron Market Conditions.

GLASGOW, April 17, 1903.—There was no meeting of the iron ring from the afternoon before Good Friday until Tuesday, 14th inst. This little recess has enabled the market rather to recover tone. It had been getting very fidgety on the reports of increasing production and declining prices in the United States. But the feeling is deepening that there will be a good outlet on your side for Scotch and English iron for some months yet, if prices on this side be reasonably moderated.

While I write Scotch warrants are 55 shillings 6 pence; Cleveland, 49 shillings 6 pence, and Cumberland, 60 shillings. There are 87 furnaces in blast in Scotland, as compared with 83 a year ago. Smelters are so well supplied with both home and foreign orders that they have not yet followed the downward course of warrants; but they will have to reduce prices soon, especially as they are getting another reduction in furnace coal this month. Meanwhile, quotations are: Coltness, No. 1, 72 shillings; No. 3, 60 shillings; Gartsherrie, No. 1, 65 shillings 6 pence; No. 3, 59 shillings; Summerlee, No. 1, 69 shillings; No. 3, 59 shilling 6 pence; Calder, No. 1, 65 shillings; No. 3, 59 shillings; Langloan, No. 1, 70 shillings 6 pence; No. 3, 59 shillings 6 pence; Clyde, No. 1, 65 shillings 6 pence; No. 3, 58 shillings 6 pence; Carnbroe, No. 1, 59 shillings 6 pence; No. 3, 57 shillings 6 pence; Eglington, No. 1, 59 shillings 6 pence; No. 3, 56 shillings 6 pence; Glengarnock, No. 1, 65 shillings 6 pence; No. 3, 59 shillings; Dalmellington, No. 1, 59 shillings 6 pence; No. 3, 56 shillings; Shotts, No. 1, 67 shillings 6 pence; No. 3, 59 shillings.

Not much faith exists here in the reported German revival. It is true that Germany has ceased for the time to force her stuff upon us, and is also less pressing upon our foreign customers, but this seems to be just because she is oversold in pig iron and in steel to the United States. And the figures at which we hear she has sold to the United States will not show up well in the profit and loss account. Some German sellers are negotiating to cancel (with a penalty) contract sales of material to Great Britain because they have sold too much to America. As to any actual improvement in the industrial condition of Germany there is no evidence. Correspondents of Glasgow houses report the contrary, and the very large export sales at ruinous prices suggest an unwholesome state of affairs.

### The Coal Trade.

The Scotch coal market has not been interrupted (as the Newcastle and Cardiff markets have been) by Easter. Here both production and shipping have gone on as usual. And though the shipments are well maintained the market generally is dull and drooping, because the output is large, the home consumption is declining, the Baltic season is unpromising and the general outlook is depressing. The shipments from Scotch ports are, so far, about 120,000 tons ahead of last year. We are not now shipping any coal to the United States, but occasional cargoes are still going from the north of England and from Wales. The total shipments to the United States in March were 111,077 tons, as compared with 6480 tons in the corresponding month. For the quarter the total has been the large one of 976,043 tons, as compared with 10,772 tons in the corresponding quarter—a very notable addition both to our exports and to our freightage.

As some question has been raised as to what qualities or kinds of coal we have been sending to the United States, I may mention that the quarter's shipments included 217,619 tons small coal (steam), 285,540 tons unscreened or through and through coal, 412,882 tons of large coal, including anthracite. The Fife collieries have been booking some orders from the Baltic, and seem for the moment to be better equipped with orders than the collieries in our district here. But the general condition of the coal trade all over the country is unsatisfactory.

### Shipbuilding Notes.

Russell & Co., Port Glasgow, have launched a steel screw steamer specially designed for the Canadian lakes service, and built to the order of William Petersen

(Limited), Newcastle-on-Tyne. This is the third vessel of a similar type launched for this firm within the last fortnight, the other two having been built on the Tyne. She is a smartly designed awning deck steamer, built to the highest class in Bureau Veritas for lake service, and is constructed for the Canadian Lake & Ocean Navigation Company for service on the lakes between Montreal and Fort William. Her dimensions are 250 x 37 feet by 16 feet depth to main deck and 24 feet to awning deck. She has lofty between decks and large gangway doors, complete installation of electric light and all other appliances suitable for her special trade. She will be engaged by David Rowan & Co., Glasgow, the cylinders being 21, 35, 57 by 36 inches stroke, with two large boilers of 180 pounds working pressure for a speed of 11 knots loaded with full cargo. The vessel is named "H. M. Pellatt."

The turbine yacht "Emerald," built by Alex. Stephen & Sons, for Sir Christopher Furness, has run her official trials on the Firth of Clyde. The trials consisted of four runs over the measured mile at Skelmorlie. Running against the tide the mile was done in 4 minutes 6 seconds, and running with the tide in 3 minutes 50 seconds, which gives an average of 15 knots per hour. All through the trials the almost entire absence of vibration was very noticeable, the vessel running with extreme smoothness. The yacht has been commissioned for six months by George Gould, and she will be the first turbine propelled vessel to cross the Atlantic.

B. T.

**The Railway Exchange.**—The Railway Exchange, which will be erected by the Standard Office Building Company, at the northwest corner of Michigan avenue and Jackson boulevard, Chicago, will be 16 stories and attic high, covering an area 171 x 171 feet. The old buildings occupying the site are being removed and construction upon the foundations will be begun within a few days. The structural material for the building was placed some months since, as previously announced in *The Iron Age*. The exterior of the building will be of white glazed terra cotta, with many bay windows extending from the fourth to the twelfth story. The principal entrance will be in the center of the Jackson boulevard frontage, but there will also be a broad entrance from Michigan avenue, and a narrow entrance at the north end of the building. All entrances will lead directly into a court, as in the Rookery Building, with a balcony around the second story. The central court will be 60 x 70 feet at the ground floor and will be enlarged to 89 x 91 at the fourteenth story. Steps of white marble will lead to the second story. A bank of 12 elevators will be placed at the north end of the building. The interior finish will be elaborate, the floors of the court and hallways being of marble mosaic and the walls wainscoted to the height of the transoms. The casings will be of mahogany, and the office floors of maple. The first and second stories will be devoted to small shops. Among the principal tenants will be the Chicago & Alton, the Atchison, Topeka & Santa Fé, and the St. Paul railways, Joy Morton and D. H. Burnham & Co., the latter being the architects of the building. The estimated cost of the building is \$2,000,000.

**The Tin Plate Rebate.**—According to the agreement entered into last fall between the American Tin Plate Company and the Amalgamated Association relative to a rebate on tin plate wages when the men are working on tin plate for export, the American Tin Plate Company have filed their first claim for the rebate due on export plate. The agreement made last fall between the American Tin Plate Company and the Amalgamated Association provided for a rebate on wages paid tin plate workers when working on export trade in order to assist the company in securing foreign trade which had been going to Welsh mills. On all tin plate for export shipment the men agreed to refund 25 per cent. of the wages paid them, and a claim for this rebate has been filed. A committee composed of representatives of the American Tin Plate Company and the Amalgamated Association will decide upon the amount of export material and apportion the assessment among the men employed in all tin plate mills that sign the Amalgamated Association scale.

### The Preservation of Iron and Steel by Paint.

By permission of the author, the following extracts are taken from a copyrighted pamphlet on the subject of paint, which has just been issued by Lionel M. Stern, who is with the Graphoid Company, Limited, of Cleveland, Ohio.

Linseed oil has been known for centuries to be the most desirable oil for the manufacture of paint, for the reason that it dries atmospherically into a leather like film, which makes it a cement for the various paint pigments, or dry paints, with which it may be mixed. The various oils which dry atmospherically are very few. Most of them either dry so slowly or to such a degree of hardness or brittleness that they are undesirable, while the balance of them are so high priced in comparison with linseed oil that their use is a decided disadvantage. It is a fact becoming more evident every day to old experienced paint manufacturing concerns that linseed oil, used in its proper proportion with pigments (and if occasion may require, with some of the volatile oils, such as turpentine or benzole, &c.), is the model oil for the purpose.

The evaporating or volatile oils of low specific gravity should be mixed with linseed oil paints only where necessity may require it, and this should be done only to lessen its viscosity or to promote a further degree of penetration into surfaces susceptible to absorption of paint to the extent most desired, or to keep down the gloss and leave a flat finish, when so required.

Metal surfaces defy the absorption of paint to such a degree that the admixture of turpentine or other volatile oils for the purpose of creating a penetrating paint is useless. The volatile oil evaporates from the paint (which lies on the surface of the metal) and leaves the paint porous and susceptible to the absorption of moisture, which invariably gains access to the surface of the metal, thereby causing rust.

Linseed oil (without the addition of Palmoid), when made into a paint and applied to surfaces susceptible to paint absorption, penetrates, to a certain degree, the pores. It becomes clinched therein, and when dry forms a coating with a maximum amount of adhesiveness without curtailing the life of its elasticity.

When the varnish gums or resins are combined with linseed oil paints they temporarily achieve a greater amount of adhesiveness, present more gloss and better finish, but when this combination is maintained, exposed to the open atmosphere, it rapidly becomes brittle, and the so-called elastic finishes in a short time either loosen from the surface or are prevented in this by being preceded by a chalky, powdery condition, which soon causes the paint to become eliminated entirely, unless the surface has been repainted often enough to counteract the drying up tendency of the atmosphere.

Linseed oil when made into a paint and applied to surfaces not susceptible to paint absorption, lies on the surface entirely, and when this surface is exposed in the open atmosphere to the scorching rays of the sun and the chilly blasts of cold weather contraction and expansion cause the paint to undergo considerable strain, while adhering to a practically nonporous surface, taxing its adhesive and elastic qualities to the utmost.

Year after year, while this condition exists, the paint becomes less elastic and more brittle. The opening of the pores of the paint at times admits moisture, while at others it becomes dried out, washing it in and out, as it were, with moisture or atmospheric gases. As time goes on the heat from the sun bakes the paint, and the harder it gets the more brittle it becomes, and subsequently its adhesiveness becomes a matter of only "here and there." The oil eventually loses its original requirements—that of being an elastic, adhesive cement for the pigment, or becomes almost entirely eliminated, and the paint either becomes chalky and washes off or becomes "alligatored" and flakes off in large scales, sometimes curling up at the edges, allowing moisture to get in underneath, thus facilitating the process of ridding the surface of the paint.

The writer has been confronted with these facts for many years and has been prompted to give the matter such thorough investigation as would enable him to create

an improvement over the old style paints for the protection of exposed iron and steel. The testing of various pigments or dry paints has convinced him that some results are different from others as to the life of the paint when applied on surfaces not susceptible to paint absorption, especially in the use of different proportions of a given pigment with the oil and in the use of different brands or makes of linseed oil; but notwithstanding all this, it was a fact clearly shown by practical tests, exposed to the weather, that a much higher point of efficiency in the wear of the paint could be achieved by increasing the adhesiveness and prolonging the elasticity of the dried linseed oil by the admixture of some sort of intermediate agency in the shape of an elastic gum, acting in the same manner as rubber physically, but superior chemically, when used in linseed oil paint.

After a long and tedious system of experimenting a means of vulcanizing palm oil into a rubber-like mass was discovered. No rosin or resins of any kind were used in the process, as they were found to be worthless.

Palm oil is a well-known material in the tin plate manufacturing business, the manufacturers using it in the fluxing process of converting their highest grade of sheet iron and steel into tin plate. The palm oil thus used prevented any accumulation of rust prior to the dipping of the plate into the solution of melted metal used for the coating or plating. This property of palm oil attracted the attention of the writer, and it was this reason which led him into the investigation now under discussion. It will be seen that palm oil itself was of no use in paint. It would never dry and was greasy like tallow. Further experimenting led to a complete physical change of palm oil, making it unrecognizable as the same material, and is now what is called by the manufacturers Palmoid. This Palmoid imparts to the oil an adhesive elastic property which increases the life of the paint from two to five years longer than if made without it.

The Wason Mfg. Company of Springfield, Mass., have announced to their 525 employees that hereafter the shops will run on a nine-hour schedule, instead of ten hours, with no reduction in pay. This new rule affects a considerable number of molders and machinists. The employees have expressed their appreciation of the new order of things by a letter to the company, in which they say they will try to produce results to make the decrease in hours worth while. The Wason Company build and equip electric cars, and in common with other concerns in the same line of work have found that the new era of street railway service has increased the demands upon their machine shops and at the same time decreased the demands upon their foundries. Steel is entering more and more largely into the manufacture of electric cars, replacing cast iron. The Wason Company have consequently converted about 40 per cent. of their foundry space to machine shop purposes, which has considerably increased that department.

#### Steamship Line from Chicago to Indiana Harbor.—

As a step toward the further development of East Chicago a new steamboat service is to be established between Chicago and Indiana Harbor. It is anticipated that the initial trip will be made in about a fortnight. The structural material for the new cement plant to be built by the Illinois Steel Company will probably be the first merchandise carried. It is thought that the new line will dock at the wharves of the Northern Michigan Company in Chicago, near the mouth of the river, which location is easily accessible to teams. A large portion of the building material that will be used at Indiana Harbor will probably be shipped by lake. The steamboat company have also made arrangements to put into commission a new boat to carry passengers exclusively.

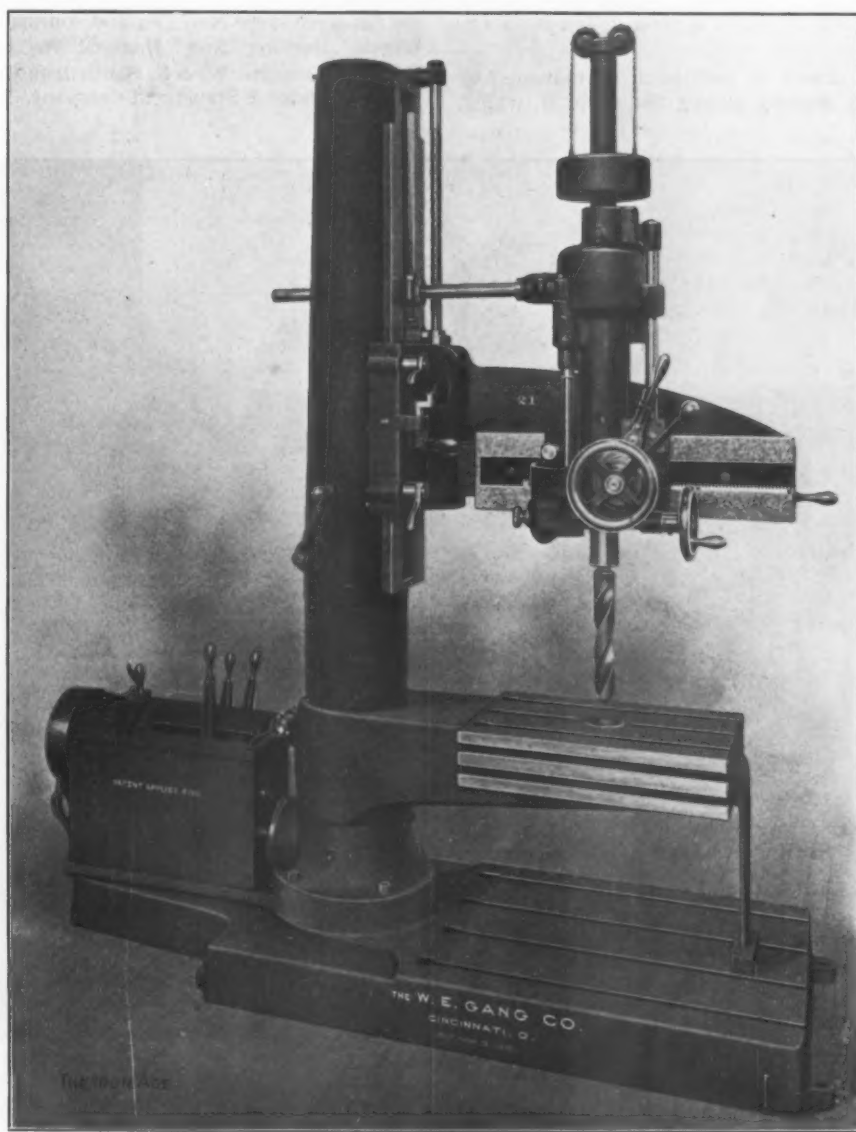
Activity continues in the coke manufacturing business in the Pittsburgh district and among independent manufacturers. Among recent contracts for the extension of coke plants and for the building of new ones, which have been awarded recently, are those of the Victoria Coal Company for 50 new ovens at Perryopolis, Pa.; the Connellsville Coke Company for new ovens in Fayette

County; the Oak Ridge Coal & Coke Company for 50 new ovens at Hastings, Pa., and a number of smaller plants along the Monongahela River. The Gilmore Coal & Coke Company have also increased their coking coal lands, and the O'Connor Coke Company have secured extensive new lands for coking purposes in Washington County.

One of the most intractable metals with which a machinist deals is aluminum. At times it works perfectly, at others it is almost impossible to handle it. Out of a lot of round bars, about 1 inch in diameter, which was to be made into small knobs like those on a door, nearly every other one was spoiled in turning, notwithstanding all the precautions that could be taken. They were

### The Gang Speed Varying Device for Radial Drills.

We here show a speed varying device which the William E. Gang Company of Cincinnati are applying to their radial drills. The idea in view in designing this device was to afford a means of getting a greater number of speeds than is usually obtainable by cone pulleys and of facilitating the changing of speeds; this, of course, is accomplished more or less successfully by a number of other machines. There is one feature, however, in this device which is worthy of note—namely, the ability to read and control the speeds directly from one point without having to operate a number of levers



THE GANG SPEED VARYING DEVICE FOR RADIAL DRILLS.

turned in a turret lathe and most of them broke off in the necks, where they were  $\frac{1}{2}$  inch in diameter. The appearance of the metal at the point of fracture was like clay, and it had about as much coherence. Some of the bars turned as easily as brass, and were apparently as strong, but the greater part of them was as has been described. The same difficulty was experienced with the sheet metal of about No. 14 gauge. It had to be bent at right angles with sharp corners, but it failed and cracked badly. Evidently commercial aluminum is not yet entirely uniform in quality. Threads cut in some of the knobs above mentioned stripped as soon as a very slight strain was put on them.

It is stated that the Committee on Wage Scales of the Amalgamated Association now in session at Columbus, Ohio, will report that men must not be permitted to work overtime under any consideration or for any compensation.

at different parts of the machine in accordance with certain directions. Fig. 1 shows the "speed box" applied to one of their radial drills, the spindle of which has a range of speeds from 25 to 400 revolutions, with 18 changes. Fig. 2 is a view of the "speed box" with the covers removed. As will be noticed, three sets of gears of three gears each, a total of nine gears, give eight speeds, and this number is doubled by the back gears on the spindle of the drill. The gears A B C are mounted loosely on the shaft S, and gears D, E and F are mounted loosely on the shaft S'. Shafts S and S' are journaled at the ends and are free to slide through the gears and journals. The intermediate gears, X, Y and Z, are fast on a shaft and mesh respectively with A D, B E and C F. This gives three trains, thus: A X D, B Y E and C Z F.

The shafts S and S' carry friction rings F' and F'', which engage in the bores of gears A B C and D E F, and are operated by means of the slid-



ing wedges W W' and the loose collars G G'. The pulley P has a long hub, which is journaled in the frame H and bracket I, and is keyed to the shaft S. The dogs Q and Q' act as fulcrums for the levers L and L', and are loosely mounted between collars on the shafts S and S' and have projections which engage in the grooves in the drum R. The drum R has one annular groove turned near the end connecting with six long and six short longitudinal grooves. The splined shaft K, journaled in J, carries a gear segment, T, at one end and the drum R on the other end. The gear segment T meshes with another gear segment, U, which is mounted loosely on the journal of the frame H'. The arrangement is such that the projections on the dogs Q and Q' engage slots on opposite sides of the drum R, and the action in indexing to obtain a given speed is as follows:

The lever M is drawn to position 1, as indicated by dotted lines, Fig. 3, thereby sliding the drum R, which,

coal per foot of grate being burned without difficulty. Grates set in this way are more easily fired and cleaned, which is a matter of importance when they are of great area.

### The New England Manufacturers of Structural Steel.

The New England members of the National Association of Manufacturers and Erectors of Structural Steel and Iron Work have withdrawn from the organization. The association was organized early in March, and the first formal meeting was at the office of the American Bridge Company at New York, March 18. It was announced that the organization had 56 members, and in the list were these New England concerns: Boston Bridge Works, Boston; New England Structural Company, Everett, Mass.; G. W. & F. Smith Iron Company, Boston; Eastern Bridge & Structural Company, Worcester, Mass.;

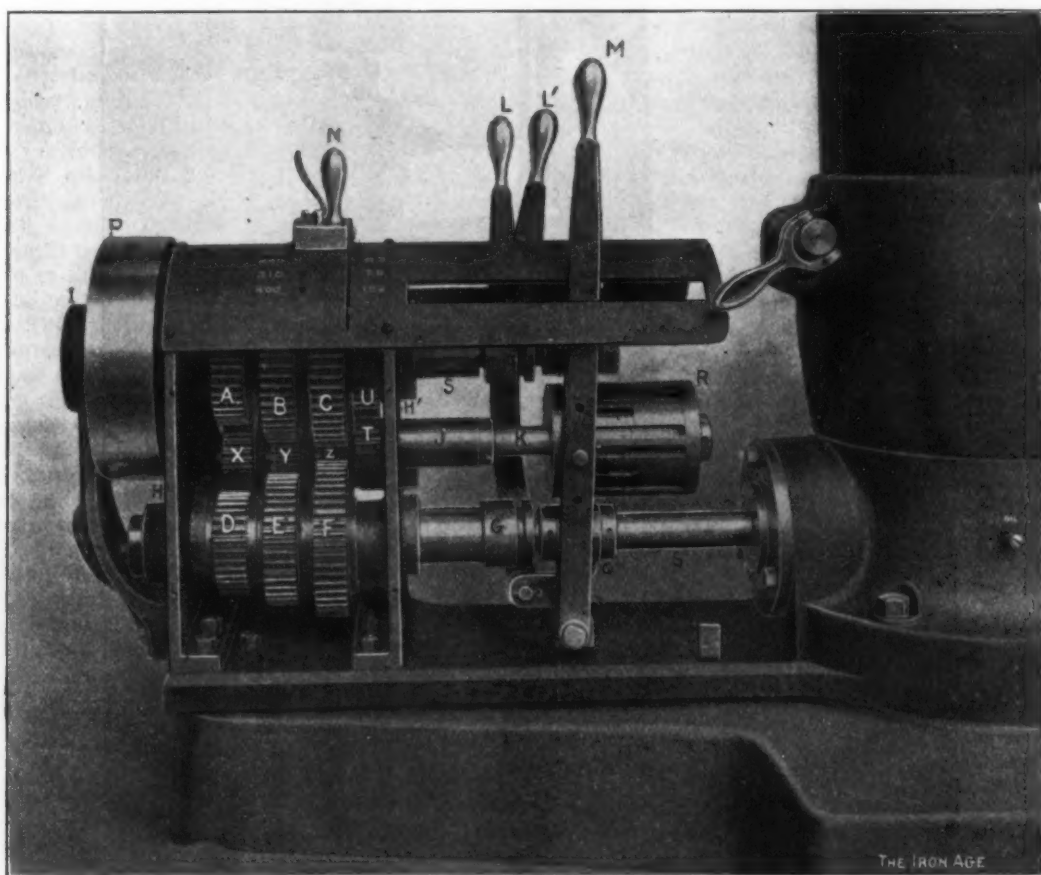


Fig. 2.—Speed Box with Covers Removed.

#### THE GANG SPEED VARYING DEVICE FOR RADIAL DRILLS.

by means of the grooves engaging the dogs Q and Q', draws the shafts S and S' with it. The friction clutches are now in gears C and F, and the projection on the dogs Q and Q', being in the annular groove in the drum R, permits the drum R to be revolved by means of the shaft K and segments T and U connected to the handle N. When the handle N is set opposite the speed required the lever M is drawn to the position 2, as indicated by the drawing. This movement locates the friction clutches in the proper gears to give the required speed, and the friction clutches are then set by means of levers L and L'. The means for adjusting the clutches are shown on the drawing. This device may also be applied to the feeds as well as speeds.

It is asserted, with what truth we cannot say, that an experiment recently tried with grates sloped the reverse way from that generally used in boiler furnaces, that is higher at the back than in the front, resulted in much better combustion than before, even 60 pounds of

Chelmsford Iron Foundry, Boston; J. T. Croft & Co., Boston; Megquier & Jones Company, Portland, Maine; Boston Steel & Iron Company, Boston; Smith & Lovett Company, Boston; James H. Tower, Boston; Builders' Iron Foundry, Providence, R. I.; Springfield Construction Company, Springfield, Mass. These concerns constitute the New England Iron League. Their membership of the association was as individuals, however, and not of the league as an organization.

The withdrawing members of the National Association are not willing to make a statement as to why they have withdrawn. Some statement may be made later, they say, if it becomes necessary. As one important official of the one of the companies told a representative of *The Iron Age*, the national association could not be said to have effected more than a temporary organization, and the withdrawing hardly means more than a declination to become members.

The purposes of the National Association as given out after the meeting, March 18, are these: "This association

has been formed for the purpose of securing and preserving equitable conditions between employers and employees, whereby the interests of both employers and employees will be properly protected." It was agreed that labor disputes affecting any firms within the association should, if necessary, be considered by the associa-

will be held in Pittsburgh, commencing May 15. This is a new organization which has grown quite rapidly, and it is stated embraces lodges at nearly all of the prominent tube works in the country. Membership is increasing rapidly in the Pittsburgh district and lodges are located at McKeesport, Pittsburgh, Ellwood City and other points

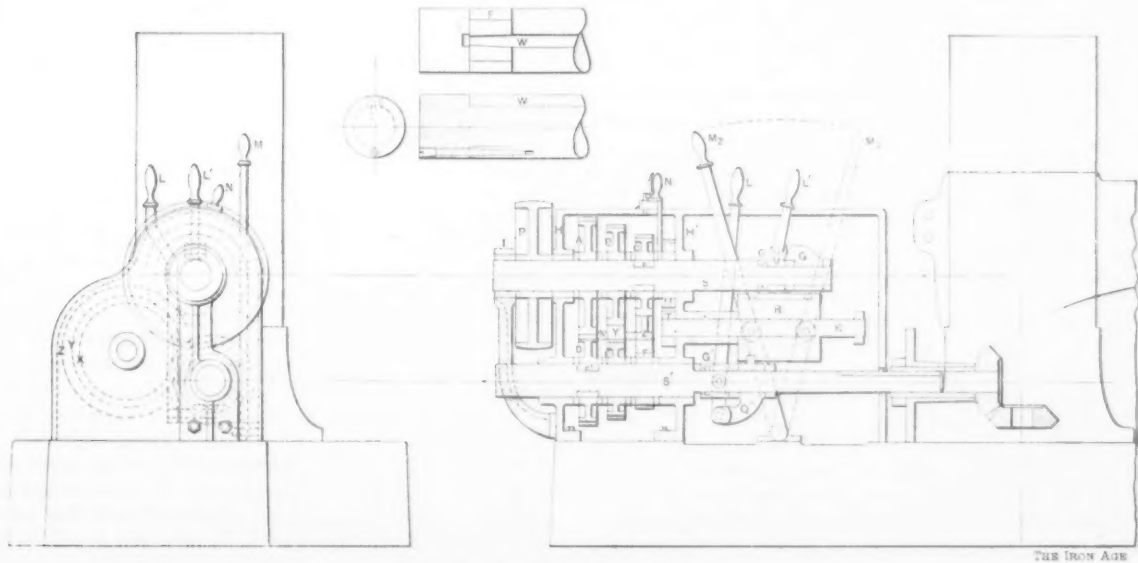


Fig. 3.—Details of Feed Box.

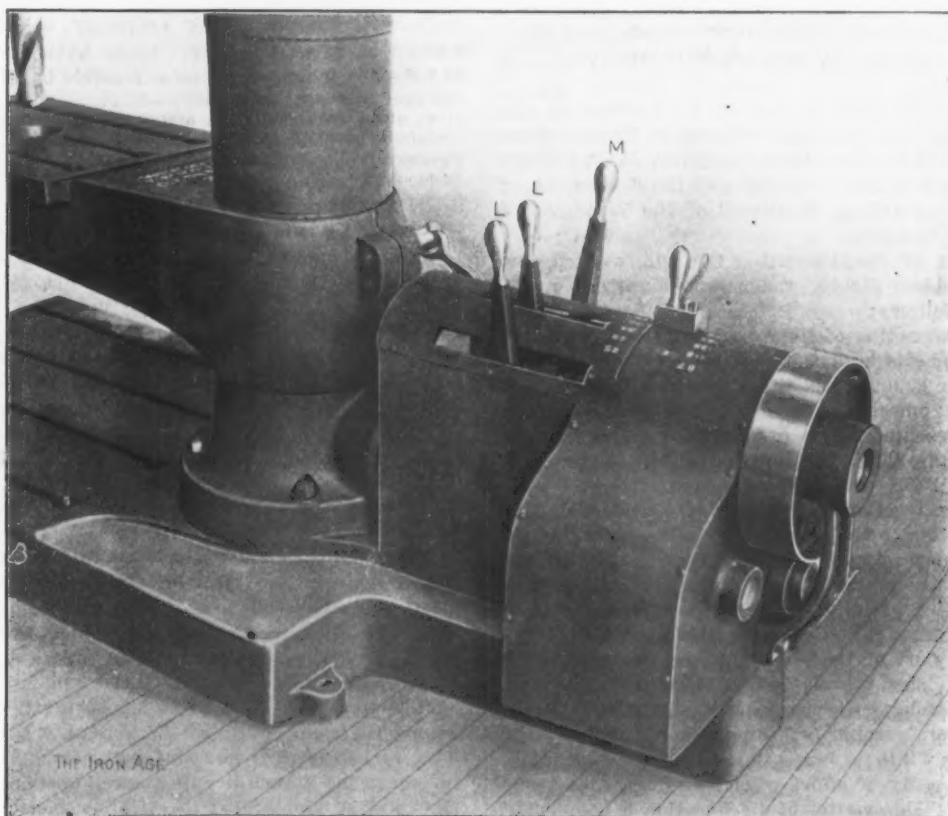


Fig. 4.—View Opposite to Fig. 1.

THE GANG SPEED VARYING DEVICE FOR RADIAL DRILLS.

tion as a body, its decision to be accepted by the firm or firms involved in the dispute.

The general opinion is that the action of the New England members is in some way connected with the strike of the employees of the American Bridge Company, but the officers of the companies concerned will not state whether this be true or not.

**Association of Tube Workers.**—The annual convention of the International Association of Tube Workers

in the Pittsburgh district. The coming convention will be the first one, and will largely be taken up with a revision of the constitution and other routine matters. It is said the men will not ask an increase in present wages.

Dispatches from Berlin announce the organization of the late Herr Krupp's Works into a joint stock company with a capital stock of \$40,000,000, under the designation of the Frederick Krupp Company. The stock remains in the hands of the Krupp family.

## The Worcester Metal Trades Association.

WORCESTER, MASS., April 27, 1903.—The Worcester Metal Trades Association held its annual meeting and dinner at State Mutual Restaurant, Monday evening, with a large attendance, nearly every member being present. The meeting had an unusual significance, in that action was taken along the line of the recommendations of the Buffalo convention of the National Metal Trades Association. Hardly a concern employing workers in iron and steel failed to be represented.

The Executive Council presented a report in which it was recommended that an Employment Bureau similar to those at Cincinnati and Cleveland, Ohio, be established in Worcester.

The report was accepted, with the understanding that the new Executive Council proceed to establish such a bureau. This action was taken after a careful and deliberate discussion of the question of its advisability. Many members strongly expressed their wish that the bureau be established, and gave reasons why it would affect their shop administration.

A committee, consisting of E. M. Woodward, Charles E. Thwing and E. W. Whitman, was appointed to bring in a list of officers. They were elected as follows: President, Clarence W. Hobbs, of the Hobbs Mfg. Company.

First Vice-President, F. E. Reed of the F. E. Reed Company.

Second Vice-President, H. V. Prentice of the Prentice Bros. Company.

Secretary, Charles E. Hildreth of P. Blaisdell & Co.

Treasurer, Alonzo W. Whitcomb of the Whitcomb Mfg. Company.

Councillors, the officers and C. E. Thwing of the Draper Machine Tool Company, George F. Brooks of the Harrington & Richardson Arms Company, M. P. Higgins of the Plunger Elevator Company and the Norton Emery Wheel Company, and A. M. Powell of the Woodward & Powell Planer Company.

The report of the Executive Council, written and read, by President Hobbs, and accepted without a dissenting vote, follows:

At the last meeting of the association there were two subjects under discussion, the general labor situation throughout the country and the proposition of a local labor bureau, as one means of coping with the labor problem as it is presented to this association. And a vote was passed referring the labor bureau matter to your Executive Council for further investigation.

Your Executive Council have given considerable time and consideration to the matter, and have conferred with the other employers' associations in the city for the purpose of ascertaining how far they were prepared to co-operate with our association in the maintenance and the use of such a bureau, and we have found not only a keen desire on the part of these associations that such a bureau be established, to the support of which they are willing to contribute their proportion, but also a feeling that the several employers' associations should draw closer together into a federation for mutual acquaintance and for unity of effort whenever storms may arise in the future. This matter of a federation is commended to your consideration, and it is hoped that there may be an expression of opinion upon the subject during the progress of this meeting.

The associations which were represented in the conferences that have been had are the Contractors and Builders', the Inside Finish Makers', the Electrical Contractors', Steam Fitters' and the House Painters'. Assurance has been given that the lumber dealers are with us, and that the several associations of retail dealers would be glad to co-operate.

The general plan of a labor bureau, the way it works and the advantages resulting from it were graphically set forth by Mr. Du Brul of the National Mutual Trades Association at our last meeting. The subject was the theme of long and careful consideration at the last meeting of the National Mutual Trades Association in Buffalo, and steps were there taken to encourage the forma-

tion of such bureaus in every manufacturing center in the country.

Your committee finds that in addition to the bureau at Cincinnati, so graphically described by Mr. Du Brul, there is also a highly successful bureau in operation at Cleveland and that similar movements have been begun in other cities. Your committee finds that a bureau costs something, and the question that is up to the association to decide is whether it is worth what it costs. Your committee thinks it is. To establish a labor bureau on the most economical basis is estimated to require for the first year an expenditure of at least \$3000 for the following specific items:

Salary of secretary.....	\$1,000
Salary of assistant secretary.....	500
Rent of rooms.....	500
Furniture and incidentals.....	500
It is probable that there would be other expenses of at least .....	500

Making a total of.....\$3,000

and this sum would practically have to be underwritten by the Metal Trades Association, although substantial contributions to the funds would unquestionably be made by the other associations named.

There are at the present time 38 members of our association, although other firms have expressed the wish to join with us. We ought to have a membership of at least 50 firms in this city, all of whom could make good use of the labor bureau. It is believed that as soon as the bureau is established, if you vote to-night to go ahead with it, there will be an immediate accession to our membership of those who wish to participate in its advantages.

How shall the money necessary to carry on this bureau be raised? Several plans have been suggested, but the one which seems most feasible is this:

We have a present membership of.....	38
If to these be added from affiliated associations, as contractors and builders.....	20
Electrical contractors.....	3
Inside finish men.....	6
Steam fitters.....	6

We have a total of.....71

If each member pays annual dues of \$20 we have raised \$1420, and the balance can be raised by pro rata assessment, either a percentage upon the pay rolls, or according to the number of men employed. A percentage upon the pay rolls of the members is believed to be the most equitable. The annual fee may be made less, say \$10, if thought desirable, and a larger amount by assessment.

It will undoubtedly be asked what will be the duties of the secretary and the assistant. When it is considered that there are employed in the mechanical trades of Worcester more than 10,000 men, by the membership of this association between 3000 and 4000, and by affiliated associations between 2000 and 3000 more, that all of these names have got to be classified, their records looked up, their capabilities ascertained, and the information acquired placed on tap to be drawn upon whenever wanted, it would seem that there will be plenty to do.

The secretary will have to be constantly moving about among the membership of the bureau, getting new members, and keeping a general oversight upon the matters in hand; the assistant will answer telephone calls, keep the records, and attend to all other clerical duties.

The idea is that the help employed by every member shall be immediately enrolled in the bureau, that all applicants for jobs be referred to the bureau, that all help shall, so far as possible, be hired through the bureau.

Whenever an applicant applies at any shop he be given an application blank to fill out, and when this is done he be told he would be sent for if wanted. The bureau should be notified each night of all such applications. If help is wanted application be made to the bureau, and from the list of unemployed in any branch of trade one or more whose capabilities are known and who seem fitted for the position are sent. If a man is discharged the bureau should be at once advised. If all these matters of detail be put into the hands of the pay clerk in each establishment the work will go smoothly and the results will be satisfactory.



Among the advantages to be gained are:

1. Each member will be able to employ his help as intelligently as he buys his goods or gives credit. He will have eliminated much of the risk of getting incompetent men and of putting costly tools and materials into their hands with the certain liability that they will be injured if not spoiled.

2. It will enable members, through co-operation, in getting a line upon those men whose influences in a shop are essentially vicious and disorganizing, and to exert upon them a powerful restraining influence, and at the same time to demonstrate to all those well disposed men and to the apprentices the value of a good record.

3. It will enable good men, who may for any cause get out of a job, a quick opportunity to get work without expense.

4. It will effectually stop the operations of that considerable class of men who are continually striking their bosses for an increase of pay because they have a better job offered them, a statement which is usually incorrect.

5. It will tend to attract good workmen to the city through the facility given for getting employment, and just as effectually tend to convince undesirable men, agitators and their ilk, that their proper sphere is elsewhere.

Your committee believes that these and many other benefits may be realized from the establishment and use of a labor bureau, and would now respectfully submit the whole matter for your consideration and action.

Among those present were:

President Clarence W. Hobbs, Hobbs Mfg. Company.  
 Secretary Charles E. Hildreth, P. Blaisdell & Co.  
 J. R. Beatty, Fairbanks Company, Boston.  
 F. L. Peterson, Fairbanks Company, Philadelphia.  
 F. H. Kappen, O. L. Packer Mfg. Company, Milwaukee.  
 E. W. Whitmore, Prentice Bros. Company.  
 F. E. Reed, F. E. Reed Company.  
 Edwin T. Marble, Curtis & Marble Machine Company.  
 J. W. Carrell, Draper Machine Tool Company.  
 Charles E. Thwing, Draper Machine Tool Company.  
 E. M. Woodward, Woodward & Powell Planer Company.  
 A. M. Powell, Woodward & Powell Planer Company.  
 Alonzo W. Whitcomb, Whitcomb Mfg. Company.  
 William Allen, Wm. Allen & Sons Company.  
 M. P. Higgins, Plunger Elevator Company.  
 Charles L. Allen, Norton Emery Wheel Company and Norton Grinding Company.  
 Aldus C. Higgins, Norton Emery Wheel Company.  
 Frank L. Coes, Coes Wrench Company.  
 Frederick Searles, Coes Wrench Company.  
 W. H. Green, Coes Wrench Company.  
 Arthur D. Putnam, Worcester Emery Wheel Company.  
 John W. Harrington, Harrington & Richardson Arms Company.  
 Edwin C. Harrington, Harrington & Richardson Arms Company.  
 A. H. Anthony, McCloud, Crane & Minter.  
 E. H. Ingram, N. A. Lombard Company.  
 R. E. Kidder, Worcester Brass Company.  
 Francis Reed, Francis Reed Company.  
 R. Stockbridge, Stockbridge Machine Company.  
 P. Doyle, Worcester Brass Company.  
 W. O. Bement, Wire Goods Company.  
 Reginald Washburn, Wire Goods Company.  
 E. H. Marble, Curtis & Marble Machine Company.  
 A. C. Marble, Curtis & Marble Machine Company.  
 A. K. Miller, Eastern Bridge & Structural Company.  
 B. Austin Coates, Coates Clipper Company.  
 George H. Coates, Coates Clipper Company.  
 James Kindred, Boynton & Plummer.  
 E. H. Reed, Reed & Prince Mfg. Company.  
 A. B. Curtis, Reed & Curtis Machine Screw Company.  
 J. L. Marshall, Osgood Bradley & Sons Company.  
 J. P. Bird, Hobbs Mfg. Company.  
 A. T. Matthews, Matthews Mfg. Company.  
 W. E. Griffin, Rice & Griffin Mfg. Company.  
 B. G. Luther, B. G. Luther & Co.  
 A. L. Rice, B. G. Luther & Co.  
 J. P. Coughlin, Page Electric Company.  
 John Nelson, *The Iron Age*.  
 J. E. Snyder.  
 Milton C. Snyder.  
 D. D. McTaggart, Worcester Warp Compressing Machine Company.  
 W. W. Dadmun, Worcester Machine Screw Company.  
 Clinton Alvord.  
 M. F. McMahon.  
 L. Robbins.  
 J. E. Windle.  
 H. G. Barr.

**Steel Casting Plant at Buffalo.**—The Gould Coupler Company, Buffalo, N. Y., will at once erect an open hearth steel plant for making steel castings. The new plant will be located just west of and adjoining the com-

pany's malleable iron works at Depew, N. Y., and will be thoroughly modern in construction. The principal building will be 252 x 390 feet. The latest devices for handling both raw material and finished product will be embodied in the equipment, including 35-ton electric cranes.

## Canadian Notes.

### Newfoundland Bounties on Iron and Steel.

TORONTO, April 25, 1903.—In the Newfoundland Legislature Premier Bond introduced the following resolutions on the 15th inst.:

The Governor in Council may authorize the payment of the following bounties on pig iron, puddled into bars and steel ingots made in Newfoundland:

1. A bounty of \$1.50 per ton on pig iron made in Newfoundland from ore, fuel and flux, the products of the colony.

2. A bounty of \$1 per ton on pig iron made in Newfoundland from ore and flux, the products of the colony.

3. A bounty of \$1 per ton on puddled iron bars manufactured from pig iron made in Newfoundland from Newfoundland ore.

4. A bounty of \$1 per ton on steel billets manufactured in Newfoundland from pig iron (made in Newfoundland from Newfoundland ore), and such other ingredients as are necessary and usual in the manufacture of steel ingots, the proportion of such ingredients to be regulated by order of the Governor in Council. Provided that in computing the bounty no payment shall be made with respect to foreign ores or metal produced therefrom used in the products herein mentioned.

5. The bounties are payable, and gradually reduced, as follows: From July, 1904, to June, 1905, the full amount fixed; from July, 1905, to June, 1906, 95 per cent. of the amount fixed; from July, 1906, to June, 1907, 75 per cent.; from July, 1907, to June, 1908, 55 per cent.; from July, 1908, to June, 1909, 35 per cent.; from July, 1909, to June, 1910, 20 per cent.

He explained that this scheme was a logical outcome of the railway policy of 1880, the basic principle of which was that railways were necessary in order to develop the latent mineral resources. The money paid out would come back to the country in the duties on the machinery required to building the smelting works. Assuming that only one blast furnace would be started, the duties on the machinery would be \$60,000, and on the necessities of those men employed \$40,000, or \$100,000 in all. This would be only 20 per cent. on the cost of the installation. Annually thereafter the revenue would benefit by \$20,000 a year, and by a comparative table it was shown that at the end of the six-year bounty period the colony would only have paid out \$1600 in bounties more than it received in duties, and would then have the enterprise in full swing and earning \$20,000 a year for the revenue afterward. That the revenue would benefit by \$20,000 a year at least from this industry is proved by the fact that last year on Bell Island \$20,000 in duties was realized. Sydney also proved the same, for where duties were only \$30,000 in 1899, before the steel works were started, they grew to \$330,000 in 1901, after that enterprise was set on foot. In the three years that concern was going the Canadian revenue had gained \$738,000 by the steel works being started, and had paid out bounties of \$449,000, leaving a surplus so far of \$289,000 in favor of revenue.

That the colony has iron ore and coal in the requisite degree was, the Premier said, conclusively proved by J. P. Howley's reports on the iron and coal areas, and the supporting testimony of Jukes, Murray, Sir Wm. Dawson, Sir Arch. Gelkie and Professor Fitten. The grand fact was that the island had the nearest coal and iron to the British markets. Even if coal should not be immediately available, charcoal from the partially burnt forests might be used as a fuel. No less than 18 per cent. of the pig iron produced in America was made with charcoal.\* It would not mean destroying the forests, as charcoal was made from the loppings and from previously burnt areas. It might even be that the Dominion Steel Company would start a smelter at Bell Island, bringing the coal there from Sydney instead of having their steamers come in water ballast to take away ore. He had discussed this with President Ross of the Dominion Steel Company at Montreal last fall, who thought it a business proposition in view of the possibility of an export duty on ore being imposed at some time by Newfoundland.

\* This is an error. It is only 1.8 per cent.—THE EDITOR.

#### Opinion of the Tariff Changes.

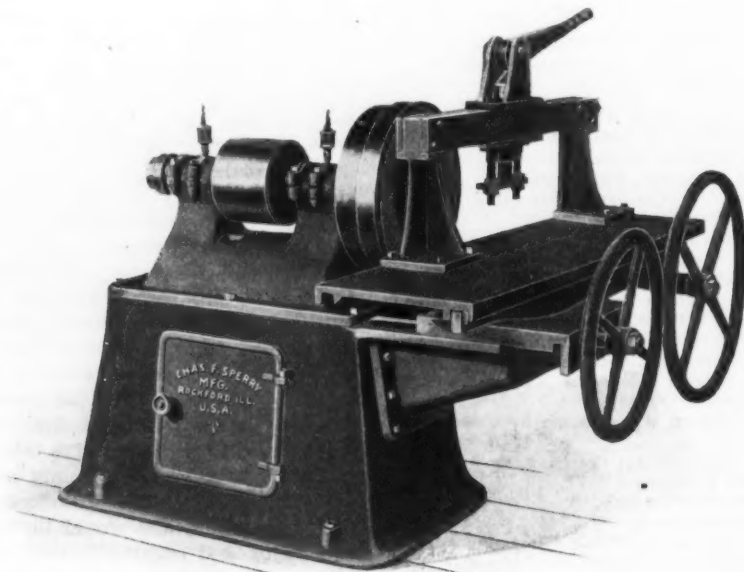
Disappointment is expressed by prominent Canadian manufacturers with the budget, for the reason that it contains no general provisions for increasing their protection, save in the case of steel rails, which are to have a \$7 duty when certain conditions are fulfilled. Even this arrangement, though commended by some, is pronounced unsatisfactory by others, for it leaves the industry of steel rail making exposed to foreign competition in the most critical period of its life—namely, at its very beginning. It is pointed out that with the uncertainty of obtaining the duty manufacturers might consider it less risky to continue selling their steel in the United States in billet form rather than to make it into rails. As they have a substantial bounty, now amounting to about \$5 a ton, on billets (pig iron bounty plus steel billet bounty), and as they have no assured protection on the steel rail, they may find it more satisfactory to export the billets than to go on building up a steel rail industry.

The arrangement would have also been more acceptable had it been broad enough to include other products more advanced than billets, particularly structural forms, plates and rods, for which there is an increasing demand

ville, Charles J. Coster, of St. John; Rt. Hon. Earl Russell, Rt. Hon. Sir John Puleston, Bart.; William Leatham Bright, Bernard Charles Molloy and James Ward Burchell, of London, England; John James McDavitt and Edward Payson Brown of New York; Richard Hunt, Edwin G. Evans, John Kilburn, John Palmer, James Barnes and T. M. Robinson, Alfred E. Macintyre, Michael A. Finn, Frederick A. Jones, Robert L. Johnston and Frederick V. Wedderburn of St. John. C. A. C. J.

#### The Sperry Face Grinder.

The hand and automatic feed and travel cylinder emery wheel face grinder built by Chas. F. Sperry of Rockford, Ill., is intended for grinding plow shares or small castings which can be rapidly clamped. The clamp is adjustable and is constructed on the toggle lever principle. The wheels carried by the machine are of the cylindrical type, and vary in size from 12 to 20 inches according to the character of the work. The chuck is of steel, and is provided with a screw so that the wheel may be set out and worn almost entirely away. The spindle is 2 7-16 inches in diameter, and bears against an end thrust of phosphor bronze. The carriage is uni-



THE SPERRY FACE GRINDER.

in Canada with large importations. Structural steel and rod mills are now being built by the Dominion Iron & Steel Company. These mills will probably be ready for producing in October. It is not impossible that the Government may yet see fit to make the same provision for these products as for steel rails.

George E. Drummond of Drummond, McCall & Co., and managing director of the Canada Iron Furnace Company, says, however, that the Government's action means the early development of a steel rail industry in Canada. Within three months the Sault Ste. Marie plant will, in his opinion, be turning out rails of sufficiently high quality and adequate quantity to warrant the imposition of the duty.

#### Minor Notes.

According to the annual report of the Ontario Crown Lands Department, just published, the iron, copper and nickel output of the province in 1902 was considerably greater than in any previous year. The nickel amounted to 5945 tons, valued at \$2,210,961; copper, 4932 tons, valued at \$686,043; iron ore, 359,286 tons, valued at \$518,445. In 1901 the iron ore output was 273,538 tons, valued at \$174,428. There was produced in 1902 pig iron to the extent of 112,667 tons, and 68,802 tons of steel.

Application has been made to the New Brunswick Legislature for the incorporation of the Aluminum Production Company, with a capital of \$6,000,000. The incorporators are: James Robinson, M.P.; James Dom-

versal to grind concave, and can be quickly adjusted for flat grinding. The machine will take work 6 inches wide by 36 inches long.

It is stated on good authority that the Lackawanna Steel Company will use power from Niagara Falls to operate the immense amount of machinery at their new plant at Stony Point, Buffalo. Arrangements have not been entirely completed, but the directors have contemplated this step for some time and plans have been drawn for part of the work. It is the intention of the company to install their own generators at the Falls by special arrangement with one of the existing power companies or by the purchase outright of one of the smaller power companies, and to connect same with their steel plant by their own special line of wires.

Some of the devices invented for use upon railways are exceedingly practicable as danger signals, but why they are not generally adopted is one of the things that are not easily understood. One of them is a torch which is attached to a pointed rod easily driven into a tie to keep it upright. By unscrewing a friction cap on the torch itself a bright red light, which neither rain nor wind can extinguish, burns for 15 minutes, and is visible for 1 mile, making it unnecessary to send a brakeman back with a red flag.

### The American Kerosene Engine.

In the American kerosene engine built by the American & British Mfg. Company of Providence, and for whom the Manhattan Transit Company of 250 East Forty-eighth street, New York, are sole agents, the base is a galvanized iron tank of a capacity to hold oil enough for a day's run under full load.

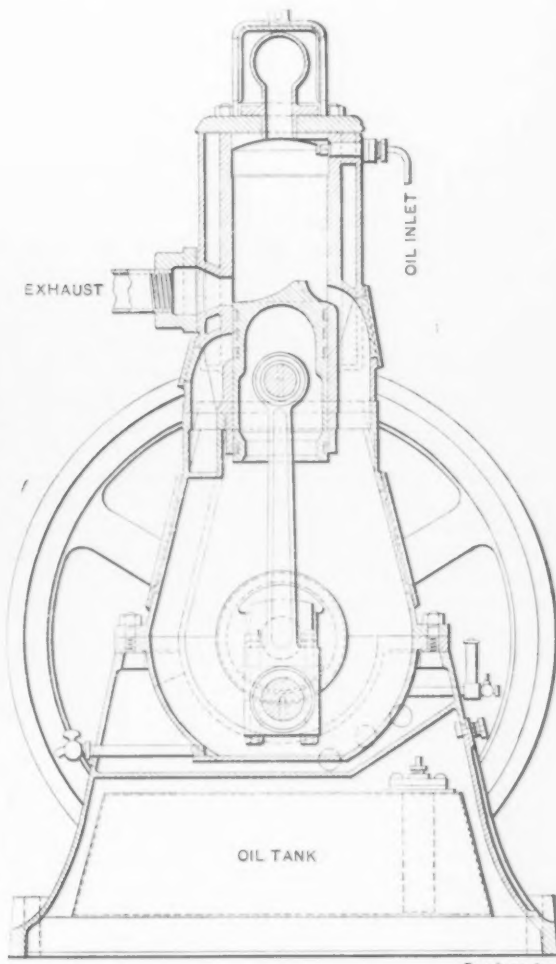
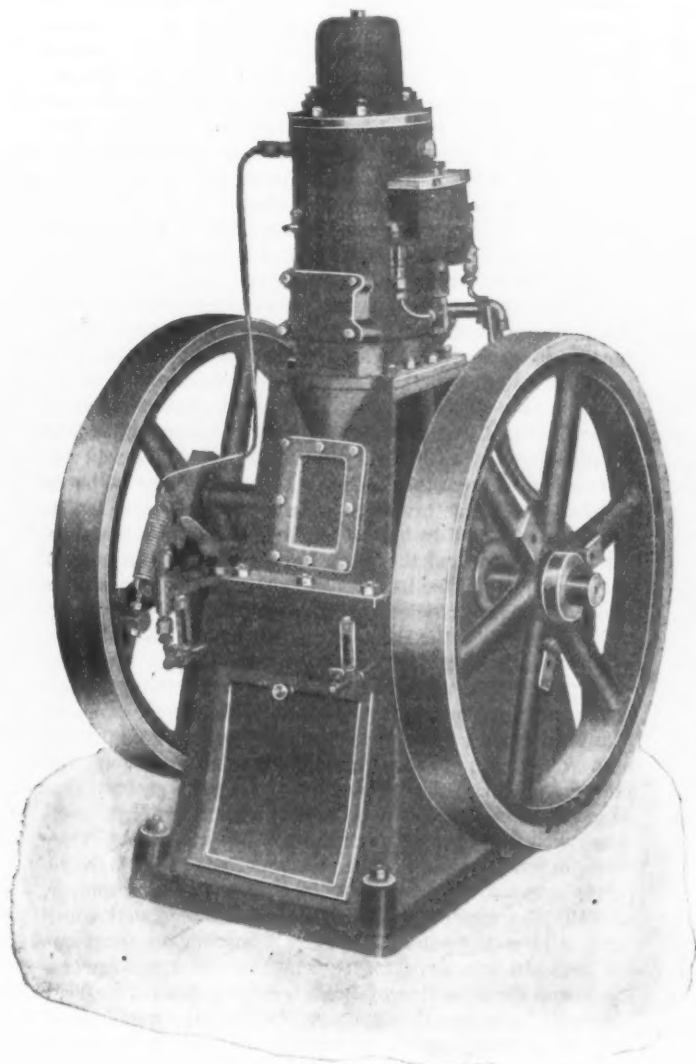
The oil is lifted from the tank and discharged into the clearance space at the top of the cylinder by a small pump. The pump is operated by the tappet action of an eccentric under control of a shaft governor, through which means a variable amount of oil is delivered to the cylinder as the variation of load may demand.

In operation a charge of fresh air is drawn in and compressed above the piston in a manner common to

small hand lever, clearly shown in the illustrations. This is used to prime the pump and fill the delivery pipe with oil before starting. It also serves to stop the action of the pump and thus to stop the engine.

Lubrication is effected by splash of oil contained in the closed crank case, and also from a reservoir with eight feed cups. Regulation is obtained by a governor which shifts an eccentric so as to give a variable throw to the pump piston. These engines are made in sizes from  $2\frac{1}{2}$  to 18 horse-power.

**Tin Plate Workers' Association.**—The annual convention of the Tin Plate Workers' International Protective Association, which have had headquarters in Wheeling, W. Va., will open on Wednesday, April 29, at Anderson, Ind. George Powers



THE AMERICAN KEROSENE ENGINE.

the two-cycle process.<sup>3</sup> A charge of oil is then sprayed into the compressed air at the right instant, and the mixture is ignited by contact with a previously heated chamber in the cylinder head. From this the ensuing combustion furnishes the energy for the working stroke, followed by the exhaust and scavenging events in the usual well-known manner. In this process there is no mixing of combustible with air until the instant ignition is intended to begin, consequently there is no possibility of premature ignition, and no failure of the engine to start, and no unexpected stops. To start up when cold, a Primus kerosene torch is used on the exterior of the igniting chamber for a few minutes; the wheels are turned by hand a small part of a revolution, and the engine starts without difficulty. After starting, the igniting chamber is automatically heated. Should a stop of five to ten minutes only be made the engine will start up without using the torch. The fuel pump can be operated by a

is president and Chas. E. Lawyer is secretary and treasurer. It is understood that there will be no radical changes in the wage scales for tin house labor. The present scale will probably be renewed with few slight changes.

A meeting of the malleable iron founders was held at Detroit last Tuesday, April 21. At a prior meeting held at Chicago a committee of five is said to have been appointed to arrange for a consolidation of malleable interests with a much smaller capital than was originally contemplated. No decisive action has been taken, however.

The Ship Owners' Dry Dock Company, Chicago, will launch this week a new steel fire boat for the city of Milwaukee. It is the first large steel craft ever built in Chicago, and the largest of its kind to be launched in the Chi-



cago River. The keel was laid last fall, but construction was retarded because of the difficulty in obtaining structural material during the winter.

## The Mosely Industrial Commission Reports.

We have received a copy of the volume containing the reports of the Mosely Industrial Commission to the United States. This commission consisted of the secretaries of the trades unions representing the principal industries of Great Britain. They visited this country during the last three months of 1902 at the expense of Alfred Mosely of London, who, as stated in the introduction to the reports, had been impressed by the fact that as a manufacturing country America was forging ahead at a pace hardly realized by either British employer or workman. He therefore came to the conclusion that it would be necessary for the workers themselves to have some insight into these developments and for that reason he invited the secretaries of trades unions to accompany him on a tour of investigation of the industrial situation across the Atlantic.

### Mr. Mosely's Observations.

In the introduction Mr. Mosely states that the delegates themselves were asked to write their reports in their own way, and their opinions on points concerning their own industries have in every case been preserved untouched. No pressure was brought to bear upon them in the formation of their opinions. Mr. Mosely makes some observations in his introduction which are decidedly interesting. He states that his personal conclusion is that the true born American is better educated, better housed, better fed, better clothed and a more energetic man than his British brother, and infinitely more sober; as a natural consequence, he is more capable of using his brains as well as his hands. Many of the men holding leading positions are either English or Scotch, and the American himself is justly proud of his British descent. He says that one of the principal reasons why the American workman is better than the Britisher is that he has received a sounder and better education whereby he has been more thoroughly fitted for the struggles of after life.

In Mr. Mosely's previous trips to America he had been favorably struck by the up to date methods of production here, both from the business standpoint and as regards equipment of our workshops. He says: "The manufacturers there do not hesitate to put in the very latest machinery at whatever cost and from time to time sacrifice large sums by scrapping the old whenever improvements are brought out." Labor saving machinery is widely used everywhere, and is encouraged by the unions and welcomed by the men, because experience has shown them that in reality machinery is their best friend. It saves the workman enormous manual exertion, raises his wages, tends toward a higher standard of life, and, further, rather creates work than reduces the number of hands employed. His observations led him to believe that the average American manufacturer runs his machinery at a much higher speed than is the usual practice in England, in other words, "for all it is worth," and the men ably second the employers' efforts in this direction.

He asks, "Do the workmen as a body do the same here? I think the answer must be in the negative." He gave as the reason the fact that in England it has been the rule for generations that, as soon as a man earns beyond a certain amount of wages, the price for his work is cut down, and he, finding that working harder or running his machine quicker (naturally a greater strain) brings in the long run no larger reward, slackens his efforts accordingly. If this be the case, can we blame the workman? He says food is as cheap (if not cheaper) in the United States as in England, while general necessities may, he thinks, be put on the same level. Rent, clothes made to order, and a variety of things, including all luxuries, are considerably dearer. The American workman drinks but little, and his house is usually well fur-

nished and fitted with luxuries in the way of bathrooms, laundries, hot water and heating systems, and other items mostly unknown to the British workman. He does not think that the workman in the United States wears out faster than the Englishman. He is infinitely better paid, therefore better housed, fed, clothed, and moreover is much more sober. Under such conditions he must naturally be more healthy. It follows, therefore, that if his working life is shorter, other causes must be sought outside of the factory to account for it. One point struck him with enormous force, which was the close touch and sympathy between master and man, which is carried a step further in the enlistment of the men's good offices to improve factory methods.

### The Reports of the Workingmen.

Coming to the reports made by the representatives of the different trades unions, a great deal is found which will be interesting reading to American employers and workmen. It is true that the time afforded for the investigation was not sufficient to enable the English visitors to make a very thorough inquiry into general conditions. They were unable to visit more than a limited section of the country, and therefore it was only possible for them to skim a few things off the top. They visited large cities rather than small towns, consequently their conclusions are drawn from what they observed in great manufacturing centers rather than from the conditions which obtain in a very large part of the manufacturing industry of the United States as conducted in establishments at comparatively isolated places. Nevertheless they were, in the main, keen observers and accumulated a fund of information not only of value to themselves, but possibly to other societies in their respective trades.

It is not surprising that throughout these reports a general air of complacency should be observed. The Englishman naturally feels that he is somewhat superior to the men of any other nation. It must further be borne in mind that these investigators are all officials of trades unions, and possibly have been occupying such positions for many years and therefore have acquired to a considerable extent the feeling of superiority which comes from officialism. Nevertheless, their confidence in the superiority of English methods has quite frequently been shaken, as shown by their frank observations.

A point which is strongly brought out in these reports is the fact that in very few instances the members of the commission were enabled to find that the American workman was driven harder than his English fellow tradesman. Evidently the opinion had obtained ground that American employers drove their men under high pressure, with little regard for their health or comfort. They were amazed to find that the American workman receives great consideration at the hands of his employer, and that he usually works in a well lighted, well ventilated and well heated factory. Numerous comparisons are made in this respect with conditions in British workshops and the attention of British employers is often very pointedly called to this matter. In fact, the members of the commission appear to have been more disposed to point out details of administration from which employers could take lessons than to show their own trades unionists wherein they could profitably learn something from the habits of American workmen.

It will only be possible to make a few extracts from some of the reports. These extracts have been taken mainly from the reports made by the secretaries of such unions as are most intimately connected with the iron and allied trades.

### The Pig Iron Industry.

P. Walls of the National Federation of Blast Furnacemen, who seems to have visited only a few furnace plants, writes in a commendatory tone of the advantages for education which he observed. Relative to actual furnace work he makes the following observations:

"American blast furnacemen are not subjected to the same physical exhaustion as those employed in England, unless when it may come from climatic causes. The use of labor saving appliances makes the work comparatively light. . . . A greater number of men are employed at the front side than is usual here. At the bunkers the tipping can be done expeditiously, as the wagons are

large, carrying from 45 to 50 tons. . . . Mechanical appliances have been introduced around the furnace, evidently not so much with the view of dispensing with labor as making it lighter and expediting the work.

"The average output of an American blast furnace is more than double that of an English furnace. But it is a mistake to assume that all American blast furnaces are of the most modern type; not more than half of them are, and not half of them are charged by elevators. Many of them look no better than those built in the North of England 10 or 15 years ago, and some no better than those built in the seventies, but owing to the greater heating and blowing power, and the ores being easier smelted, the output is comparatively good.

"We failed to find ocular evidence of the American workman running at high pressure. Certainly the machinery runs at a high speed, but the man showed no signs of overexertion. According to some writers, he is supposed to love his machine and his work so much that he almost desires to take it home with him. We saw the same preparation for the bell as here, and the same rush at the first sound of it.

"Skilled mechanics and leading men in our factories and iron and steel works are as well clothed and fed as the same class in America, but when it comes to the unskilled or the general body of workers there is a marked difference. In the former case the difference in wages is not so great, but in the latter it is not less than 60 per cent., and when we come to what is termed the common laborer, the Americans get practically double the wages paid in England. This class getting sufficient wages to feed and clothe themselves and their families well causes the general body of American workmen to present a prosperous appearance. After careful investigation I came to the conclusion that, comparing wages and the cost of living, there is at least an average of 25 per cent. in favor of the American workman."

#### **The Foundry Trade.**

J. Maddison of the Friendly Society of Iron Founders of Great Britain and Ireland makes a great many comparisons of wages and gives numerous details of his visits to the foundries. At Cleveland he visited a large foundry and says he found the men there working considerably harder than in England. At Chicago he saw the foundry of the Allis-Chalmers Company, which he said was the best he had seen up to that time, being well lighted, of a good height and having good cranes. It was also provided with apparatus for cooling the shop in summer and heating in winter. Fancy, he says, any English firm being asked to make such provision for the comfort of its employees. At Milwaukee he saw the West Allis works of the Allis-Chalmers Company, which he describes, and then states that a number of ventilating turrets are located in the roof and provided with exhaust fans, driven by electricity, for removing the gas and smoke when necessary. It is also intended to heat the building on the hot water system in cold weather. Such consideration for the comfort of their workmen, he again says, never enters the mind of the British employers. Most of the foundries he visited have a chemical department for analytical purposes, which might be profitably adopted in Great Britain.

At Pittsburgh, in the works of the Westinghouse Company, he admired a bonus system, which he said was not carried out as is being attempted in England. He was shown a job by a young man who made it. Although allowed eight days for making it, he completed it in five, but not the slightest attempt was made on the part of the firm to participate in the three days made by extra effort, the man being paid the full eight days. When he visited Philadelphia he was not pleased with the conditions in the Baldwin Locomotive Works. He condemned the piece work system, in which jobs were taken by contract by one man and sublet to men under him. He says the pace is very fierce and the work scandalously finished. He attributed the success of this firm to cheap labor and rough work. But he was probably influenced in his opinion by the fact that the Baldwin Works are run nonunion. At Washington he visited the Navy Yard and considers the foundry a disgrace to the country. In summing up he says that

the English employer often whines over the restriction of apprentices to one for four journeymen, but in the States they only allow one to eight journeymen. The British employer has more to learn from America than the British workman.

#### **Rolling Mills and Steel Works.**

James Cox of the Associated Iron and Steel Workers of Great Britain makes an exceedingly good report, which is one of the longest in the series. Referring to social conditions, he states that to the ordinary workingman the cost of living is not so much higher in America as he had been led to believe. He estimates that, on the whole, the cost of living on the same plane in both countries would be about 20 to 25 per cent. higher in America than in England. Children appear to be kept longer at school than the children of the working classes in England, higher wages enabling the parent to do this. He attributes the success of American industry, in addition to great natural resources, to the marvelous engineering ingenuity and initiative, remarkable through every phase of manufacture in its reduction of manual labor combined with great productiveness. He says there is no doubt that the leading mills of American manufacture are far ahead of the best English mills in their arrangement and outputs. On this point he says: "I have seen nothing like it in this country, either in the matter of output or labor saving appliances. To the average British iron and steel workers the output of these mills will be incredible." While he criticises the finish at the rolls, as compared with the finish of the British plate mills, he nevertheless states that the plates go straight from the rolls through flattening rolls which take out all buckle, and so far as he can judge this puts, without labor, a finish equal to what has been done by the British roller sometimes with some amount of difficulty and at the expense of considerable time on thin work.

He gives unstinted praise to the sheet mills at Vandergrift, Pa. Comparing work at this establishment with work in England, he states that "If the best of American workmen had to come here and work, they would be as great a failure as many of our managers would be in America, simply because employers do not pay as much attention to such elementary matters of manufacture, as, for instance, uniformity in material." He was greatly impressed with the sanitary conditions under which men work in the American tin houses. He was in a tin house at the Laughlin Works, at Martin's Ferry, Ohio, and assures his readers that the room was as free from smoke and the air as pure and clear as in their sorting rooms. He says no statement could be wider of the actual truth than that men are so rushed in American works that only the young and strong can stand the strain, and that only for a short time. He saw rollers working at the rolls who were 50, 60, and in one case, 72 years of age. A strong point he makes is that as a matter of fact the men who work the hardest are the salaried staff—namely, the manager, superintendent, engineers and foremen. But he says that in wage disputes and the relations between employers and workmen's organizations Americans have much to learn from the British. On this point he says it would be helpful if "a committee of the leading trade union leaders were to come over and make a personal investigation into our trade union methods and their relation with the employers' sections."

#### **Among the Machinists.**

George N. Barnes of the Amalgamated Society of Engineers also makes a long report, which contains a great deal of interesting information. He observed that at the new shops of the Allis-Chalmers Company, at Milwaukee, Wis., he found the plan of the works most elaborate and on a larger scale than he had seen anywhere. He states that in the heavy machine shop a planed floor plate had been placed, about 60 x 240 feet in superficial area, and upon which either the work to be operated upon or the operating machine tools are bolted down, as found convenient. Upon this, while he was there, work was being fed through between milling heads, each weighing many tons, and at the same time other operations were



going on, each of the operating tools being supplied with a separate motor. He found Cincinnati, he says, a low paid place generally, with the hours of labor in the machine shops 57 per week, with "overtime loosely arranged and, I am afraid, not in all cases paid." In the Westinghouse shops at East Pittsburgh, Pa., "everything was in apple pie order," and from the point of view of present production the works are as near perfection as possible. It strikes him, however, that the minute specialization carried out there, and to some extent elsewhere in America, would seem to predict less mechanics in the future and more regimentation of specialist labor. He also takes a fling at one of the large shops in Philadelphia. He says that the equipment is old and the methods of work old fashioned; there is no proper attention to sanitation or cleanliness, and in so far as production is cheap it is because of shoddy work and sweated labor. He admires the shop of Hoe & Co. in New York, which he pronounces one of the best he had seen in regard to light, sanitation and cleanliness, and also the percentage of earnings there rating somewhat larger. He was pleased with the conditions prevailing in the works of the Brown & Sharpe Mfg. Company at Providence, R. I., particularly the regulations with regard to apprenticeship. He believes that the British should follow the lead of the American in encouraging inventiveness and initiative, in fully utilizing machinery and perhaps in organizing industry on a larger and therefore cheaper scale.

#### Shipbuilders and Boiler Makers.

D. C. Cummings of the Iron and Steel Shipbuilders' and Boiler Makers' Society found little to commend. He says that in the marine boiler shops of the American Shipbuilding Company, on the Great Lakes, instead of their possessing anything of a novel or startling character in respect to new machinery, the contrary was the case. He was disappointed at the plant of the New York Shipbuilding Company at Camden, N. J. He says that the central idea governing the mind of the management seems to be building ships on the bridge building principle. Cramp's shipyard at Philadelphia received most praise from him, because, as he says, it is modeled upon British lines. Pneumatic tools were used there to a larger extent than in England, but he found that the shipyard manager would not commit himself by saying that they were cheaper than British methods. He compared the Baldwin Works at Philadelphia unfavorably in many respects to British locomotive shops, and says that American locomotives, compared with the British, are extremely ugly and of inferior work and finish, and although it may be argued that they serve their purpose, yet he should be sorry to see such an age of utility in Great Britain that would sacrifice all beauty and finish. He differs decidedly with his fellow members of the commission in his observation that gambling and pleasure seeking appear to be characteristic of the American people. This, he says, taken in conjunction with their ordinary restless spirit, seems to shorten life, make men prematurely old and increase insanity. Climatic conditions may be to some extent the cause of the generally unhealthy look of the American people, but the opinion generally expressed to enjoy life while it lasts has also some effect. "There is, however, less regard for human life in America than in Great Britain. Life altogether is held cheaper, and that may be inherited from earlier times, when firearms were used on the slightest provocation."

Alex. Wilkie of the Associated Shipwrights' Society says that the work in the shipyards is not so substantial as in Great Britain, and there does not appear to be the same regard for completeness as in British shipyards. The vital distinction appears to be that the work in the British shipyards not only has a better finish, but is of a more stable and enduring character. On the American side they build more for the present.

#### The Cutlery Trade.

Robert Holmshaw of the Sheffield Cutlery Council expresses his pleasure with the workshops which he saw, which, with few exceptions, were very good, being large, well lighted, and heated by steam pipes. This is not the case in Sheffield, where the open fire place has to be relied

upon for warmth, and only succeeds in warming that part of the workshop nearest to it. He says that every attention is given to the comfort and convenience of the men in America, with the result that the great waste of time so common in Sheffield is unknown. In an American factory a good stock of raw materials used in manufacturing is kept ready for use, such as blades, handles, scales, springs and all other parts required in the making of a knife. This means that there is no unnecessary waste of time, as is the case where a man, when receiving an order, has to repair to various parts of the factory and perhaps to some distant factory to secure the requisites for his work. He says that it is undoubtedly true that there is less drinking among American workmen than among British workmen. This applied not only to the native American, but to Englishmen settled in America, who speedily fall into the settled customs of the country. He makes the remark that in this country labor saving machinery is not used for the purpose of reducing wages. He says that "save labor, cheapen production and increase the output" are the watchwords of American manufacturers, and to the attainment of these ends all their energies are bent.

#### Nut, Bolt and Tube Trades.

T. Jones, representing the Midland Counties Trades Federation, was interested in the manufacture of nuts, bolts, edge tools, chains and tubes. He speaks in commendatory words of the use of automatic machinery in the manufacture of nuts and bolts. It is interesting to observe that he was denied admission to the works of the National Tube Company at McKeesport, Pa., for the reason that English tube manufacturers had refused members of the firm admission to their works. He says: "It was rather hard lines on us that we should have the sins of the employers in this country visited upon us for any act of theirs over which we had no control." He mentions among points of difference between American and English practice one which strikes him forcibly—the absence of class distinctions such as exist in England. This is most pronounced in the relation of employers and employees. A man is not looked upon as part of the machinery of the firm, or as one who ought to be thankful to have employment found him. He is rewarded for any suggested improvement in the methods and, if it is adopted, his wages are not reduced because he is enabled to get more work done. He earns better wages but works longer hours. He is not permitted to lose time, or he is heavily fined for it. The fact that the American workman has better opportunities for his education, both elementary and secondary, gives him an advantage.

#### Miscellaneous Trades.

T. A. Flynn of the Amalgamated Society of Tailors found that American employers believe that machines rather than men or women ought to be driven, and the clever workman who, by invention or suggestion, enables his employer to carry out this ideal is encouraged in a manner delightfully real and sincere. He says that there is no manner of doubt that the working class of America saves more money and saves it more easily than the working class of England. The absence of gambling on horse races and heavy drinking no doubt contribute to this result. "Hard work, as it is understood in England, only finds a hiding place in industrial America, and as soon as it is discovered a machine is patented which drives it out." American capitalists do not want hard work, and if they do they know a machine will work harder and longer than a human being and will cost less.

W. B. Hornidge of the National Union of Boot and Shoe Operatives says that taking into consideration the whole of the circumstances in connection with labor in his trade in England and the States, the position of the workers is more favorable in America than it is at home.

G. J. Lapwing of the Amalgamated Society of Leather Workers finds that when the American employer learns of a machine on the market which is an improvement on the one he already has, it is out with the old one and in with the new. He does not allow his love for the old idea to run away with his common sense.

M. Deller of the National Association of Operative Plasterers was one of the most critical of all the members of the commission. He inspected with the eye of the prac-



tical mechanic the plastering in every building he visited. He says that "there is no denying the fact that on the whole more ground is covered by plasterers in America than at home, but I question whether more labor is expended in production than is done here. To use an Irishism, the reason why they do so much more is that it is not more than half done." He says that the Buffalo post office is a fine building, with plenty of plastering of fairly good design, but executed in such a manner as to make it a standing disgrace to the trade. In going around Pittsburgh he discovered some "slum property that would even make some of our own look, comparatively speaking, like palaces." On visiting Washington for the purpose of having an audience with President Roosevelt, he states that even in the room where he was received "the plastered walls were very poorly finished, although it is only fair to say that some decent work was to be found in the Congress house and the library."

W. C. Steadman of the Parliamentary Committee of the Trades Union Congress commends the educational system of the United States. He says that the apprenticeship system, if it ever did exist, is dying out. He attributes this to the subdivision of labor and the introduction of improved machinery. He says that the American workers do not work any harder than their English brethren, the tendency being to use improved machinery of the latest type. "While we in this country use machinery to decrease wages, in America it means more wages and shorter hours." He says that no doubt the best factories and

rapidly jots down the seconds the slab is in the rolls, the click of entering and leaving being plainly heard.

The interval of time in seconds while the piece is on the back side of the rolls until it enters from the front side again is also accurately noted. We thus have a continuous record of the power developed, as follows:

Starting from the time the new slab enters the rolls for the first pass we have, as shown by the chart, a horsepower of 81 for 1.1 seconds, then an interval of friction load for three seconds. Next the power used in the second pass is 78 for 1.2 seconds, and again a friction load of four seconds, and so on until the sheet is rolled. We now have in tabulated form, for one sheet completely rolled, the horse-power seconds as follows:

First pass.....	81 H.-P. for 1.1 secs.	89.1 H.-P.-secs.
Friction .....	35 " " 3 "	105 "
Second pass.....	78 " " 1.2 "	93.6 "
Friction .....	35 " " 4 "	140 "
Third pass.....	76 " " 1.4 "	106.4 "
Friction .....	35 " " 6 "	210 "
Fourth pass.....	70 " " 2 "	140 "
Friction .....	35 " " 1 "	350 "
Fifth pass.....	62 " " 2.1 "	130.2 "
Friction .....	35 " " 5 "	175 "
Sixth pass.....	45 " " 2.2 "	90 "

Total ..... 29.0 secs. 1,629.3 H.-P.-secs.  
1,629.3  
29 = 56.2 = average H.-P. for 29 seconds.

These observations are continued for 15 or 20 slabs, and in the meantime, by means of the surface condenser

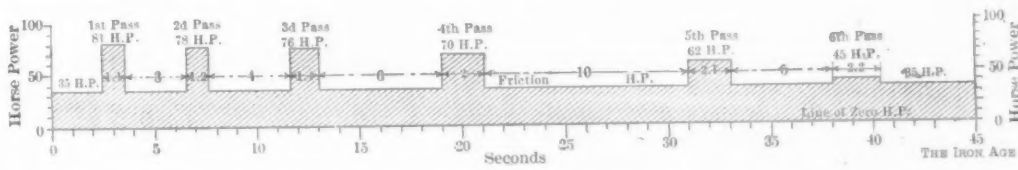


DIAGRAM SHOWING POWER CONSUMPTION IN ROLLING SHEET FOR 6-INCH CROSS CUT SAWS.

workshops are far better than in England. Workmen are treated as men by their employers, who are always accessible to their men, and in most cases have far better opportunities for promotion than in England. He says, however, that, "taken as a whole, the Americans do not turn out better work than ours; in fact, to give my biased opinion, I do not think it so good." He concludes that the English worker has nothing to learn from America, but the employers have a lot.

Measuring the Power Required for Sheet Rolling Mills.

H. G. Manning, mechanical engineer of the Jessop Steel Company of Washington, Pa., has contributed to *Engineering News* the following article:

In the writer's experience he has found that the common steam engine indicator, by itself, gives only a slight clue to the average power developed by a rolling mill engine, when sheets are being rolled of comparatively short lengths. He has therefore found it very convenient to use the power chart shown in the accompanying figure.

In the tests which the writer has made every working day, in order to know exactly the running conditions of the steam power portion of the Jessop Steel Company plant, it is necessary to know precisely what the average indicated power is during a certain time each day. This time is taken when a number of slabs are being rolled into sheets of uniform size, the work covering a period of 15 to 20 minutes. From the time a slab enters the rolls until the sheet is finished the indicator pencil is held to the drum, and at each pass steam is reversed in the indicator from one end of the engine cylinder to the other. It will be found, as would be expected, that the point of cut off of the engine varies with every revolution; but a practiced eye can pick out the expansion curve for each pass. In the meantime an assistant stands near the rolls with a stop watch graduated to fifths of a second and

and open heater, an assistant is taking a reading of the actual quantity of water passing through the engines during the above period. This reading is taken by the following method, which has been used for a number of years by the writer.

On the body of the heater is a vertical water glass, on which are two marks, A and B. Before making the test the weight of water at the temperature of the hot well contained in the heater between these two marks is obtained by drawing off and weighing.

Just before making the test all heating steam is shut off from the heater, and no water enters excepting that coming direct from the engine through condenser and air pump, which pumps directly into the heater without intervening hot well. When the test is started water is drained from the heater below the lower mark "B" on the gauge. After the draining valve is closed the air pump immediately raises the water in the glass, and the instant the level reaches "B" the time is noted. The air pump continues to raise the water in the heater until the test is finished, when the assistant is signaled that the test is completed, and he notes the height of water in the glass above "B." As the heater has already been calibrated, the pounds of water used by the engine during the test is correctly known and the method is accurate when accurately performed.

A test of this sort, occupying 15 or 20 minutes in morning and afternoon, keeps everybody interested in their work. The power house employees are spurred to do their best, and the company know every day precisely what their engines are using in pounds of water per horse-power per hour.

H. P. Elwell, formerly superintendent of the Fore River Ship & Engine Company, has returned from a six weeks' trip to Scotland, where he has been purchasing steel. The yard has lately received two shipments of steel shapes for the frame of the six-masted schooner "William L. Douglas" and the two Fall River steamboats.

## Recent Advances in the Standardization of Steel Specifications.

The first successful effort in America to standardize specifications for steel was made in August, 1895, by the Association of American Steel Manufacturers, a technical organization formed to discuss matters pertaining to the manufacture and use of steel. These specifications the Steel Association revised on July 17, 1896, and again on October 23, 1896. They included specifications for structural steel for buildings, bridges and ships, special open hearth plate and rivet steel and structural cast iron.

Although these specifications were at first criticised and referred to by the technical press and by some engineers as "manufacturers' standards," they nevertheless grew in favor among consumers when it was found that just as good steel was furnished as when using specifications containing many additional tests and requirements unnecessary in the present state of the art of making steel. The customer also soon appreciated that these standard specifications secured closer competition and more prompt deliveries.

At the meeting of this association, held in Pittsburgh on February 6, 1903, the practical value of these standard specifications was commented on, and the advisability of their revision was discussed. The then recent suggestion of the Committee on Iron and Steel Structures of the American Railway Engineering and Maintenance of Way Association as to the advisability of adopting one grade of rolled steel for all structural purposes, except rivets, was seriously considered, as well as their suggestion that the percentage of elongation be made a factor of the ultimate strength. Attention was called to the fact that, if a general revision of the standard specifications was contemplated, it should include the revised schedule of standard permissible variations in the weight of sheared plates, as revised by the Steel Association on April 19, 1902. The detailed discussions of each paragraph of the Manufacturers' Standard Specifications of October 23, 1896, was followed by the appointment of a committee representing all interests, who were instructed to incorporate the changes suggested at the meeting and thoroughly revise the Manufacturers' Standard Specifications. Their report has since been submitted and approved by a letter ballot of the following steel companies, members of the Association of American Steel Manufacturers:

American Iron & Steel Mfg. Co.	Lukens Iron & Steel Co.
American Steel & Wire Co.	Maryland Steel Co.
American Steel Hoop Co.	National Steel Co.
Bethlehem Steel Co.	National Tube Co.
Cambria Steel Co.	Otis Steel Co., Limited.
Carbon Steel Co.	Passaic Steel Co.
Carnegie Steel Co.	Pennsylvania Steel Co.
Central Iron & Steel Co.	Pittsburgh Forge & Iron Co.
Colorado Fuel & Iron Co.	Reading Iron Co.
Crucible Steel Co. of America.	Republic Iron & Steel Co.
Diamond State Steel Co.	A. & P. Roberts Co.
Glasgow Iron Co.	Shelby Steel Tube Co.
Illinois Steel Co.	Standard Steel Works.
Inland Steel Co.	Tennessee Coal, Iron & Railroad Co.
Jones & Laughlin Steel Co.	Tidewater Steel Co.
Lackawanna Steel Co.	Worth Brothers Co.
Lorain Steel Co.	

The revised Manufacturers' Standard Specifications recommend one grade of steel for railway bridges, except rivets, of a tensile strength of 55,000 to 65,000 pounds, and a steel of this same range in tensile strength for flange or boiler steel.

In structural steel they make the required elongation for usual thicknesses a factor of the ultimate strength, determined by dividing 1,400,000 by the ultimate strength. The Railway Committee use 1,500,000. For a range in tensile strength of 55,000 to 65,000 the manufacturers therefore specify 25.5 and 21.5 per cent., respectively; whereas the Railway Committee require 27.3 and 23.1 per cent.

The prompt adoption by the Steel Manufacturers' Association of the recommendations of the Railway Committee, even before the latter committee had submitted its report to its association, forms an important practical advance in the standardization of steel specifica-

Table I.—Comparison of the Physical and Chemical Properties Specified for Structural Steel.

	1. Association of American Steel Manufacturers. February 6, 1903.	2. Association of American Steel Manufacturers. October 23, 1896.	3. American Steel Specifications, International for Testing Materials.—August 10, 1901.	4. Association American Railway Engineer- ing and Maintenance of Way Association. March, 1903.	5. American Railway Engineer- ing and Maintenance of Way Association. March, 1903.	6. Company specification now in force.
PHYSICAL PROPERTIES.						
Rivet steel:		Structural steel.	Structural steel.	Structural steel for buildings, bridges and ships.	Material for steel structures.	Structural steel for buildings.
Ultimate strength.....	48,000 to 58,000.	48,000 to 58,000.	50,000 to 60,000.	50,000 to 60,000.	45,000 to 55,000.	48,000 to 58,000.
Elastic limit.....	One-half ultimate strength.	One-half ultimate strength.	One-half ultimate strength.	One-half ultimate strength.	One-half ultimate strength.	One-half ultimate strength.
Elongation in 8 inches.....	180° flat.	26 per cent.	26 per cent.	180° flat.	1500,000	26 per cent.
Bending test.....	Ultimate strength.	180° flat.	180° flat.	180° flat.	Ultimate strength.	180° flat.
Steel for Railway Bridges.	55,000 to 65,000.	Called "Soft Steel"	Called "Soft Steel"	Called "Structural steel"	Called "Structural steel"	180° flat.
Ultimate strength.....	One-half ultimate strength.	One-half ultimate strength.	One-half ultimate strength.	One-half ultimate strength.	One-half ultimate strength.	One-half ultimate strength.
Elastic limit.....	1,400,000	1,400,000	1,400,000	1,400,000	1,500,000	1,500,000
Elongation in 8 inches.....	25 per cent.	25 per cent.	25 per cent.	25 per cent.	25 per cent.	25 per cent.
Bending test.....	Ultimate strength.	Ultimate strength.	Ultimate strength.	Ultimate strength.	Ultimate strength.	Ultimate strength.
Medium Steel.	180° over diam. = thickness.	180° over diam. = thickness.	180° over diam. = thickness.	180° over diam. = thickness.	180° over diam. = thickness.	180° over diam. = thickness.
Ultimate strength.....	60,000 to 70,000.	60,000 to 70,000.	60,000 to 70,000.	60,000 to 70,000.	60,000 to 70,000.	60,000 to 70,000.
Elastic limit.....	One-half ultimate strength.	One-half ultimate strength.	One-half ultimate strength.	One-half ultimate strength.	One-half ultimate strength.	One-half ultimate strength.
Elongation in 8 inches.....	22 per cent.	22 per cent.	22 per cent.	22 per cent.	22 per cent.	24 per cent.
Bending test.....	Ultimate strength.	Ultimate strength.	Ultimate strength.	Ultimate strength.	Ultimate strength.	Ultimate strength.
Steel for buildings, train sheds, high- way bridges and similar struc- tures.....	180° over diam. = thickness.	180° over diam. = thickness.	180° over diam. = thickness.	180° over diam. = thickness.	180° over diam. = thickness.	180° over diam. = thickness.
Steel for railway bridges.....	Not over 0.10 per cent. phos- phorus	Not over 0.10 per cent. phos- phorus	Not over 0.10 per cent. phos- phorus	Not over 0.10 per cent. phos- phorus	Not over 0.10 per cent. phos- phorus	Not over 0.08 % phos. If acid not over 0.08 % phos. If basic not over 0.06 % phos.
Rivet steel.....	Not over 0.08 per cent. phos- phorus	Not over 0.08 per cent. phos- phorus	Not over 0.08 per cent. phos- phorus	Not over 0.08 per cent. phos- phorus	Not over 0.08 per cent. phos- phorus	Not over 0.05 % sulphur. Not over 0.04 % phosphorus. Not over 0.04 % sulphur.
Ultimate steel.....	Not over 0.08 per cent. phos- phorus	Not over 0.08 per cent. phos- phorus	Not over 0.08 per cent. phos- phorus	Not over 0.08 per cent. phos- phorus	Not over 0.08 per cent. phos- phorus	Not over 0.05 % sulphur. Not over 0.04 % phosphorus. Not over 0.04 % sulphur.
						Same.

tions. It means that in place of the existing range of from 52,000 to 70,000 pounds, the manufacturers will now be required to furnish all steel for general structural purposes within 55,000 to 65,000 pounds, a range of only 10,000 pounds per square inch. This will necessitate more care in both melting and rolling, and will result in a more uniform product than furnished under existing specifications.

Before the Railway Committee had reached the above decision the American Bridge Company had issued a specification for structural steel for buildings calling for a steel of 55,000 to 65,000 pounds, with 24 per cent. elongation, and which specification had since been adopted by the Bureau of Docks and Yards of the United States Navy. We are informed by the vice-president of the American Bridge Company, C. C. Schneider, who is also a member of the Railway Committee, that his company heartily indorse the action of the Railway Committee in adopting a steel of this same range in tensile strength for railway bridges, but that until pending questions in reference to unit strain and the impact formula, &c., are decided his company will not revise their present specification for railway bridges, but that when such revision is made a steel of 55,000 to 65,000 pounds will be specified.

Table No. 1 gives a comparison of the physical and chemical properties called for in six most important specifications for structural steels, including the revised specification about to be issued by the Association of American Steel Manufacturers, their former specification of October 23, 1896, the American Standard Specifications of the International Association for Testing Materials of August 10, 1901, the American Railway Engineering and Maintenance of Way Association Specification of March, 1903, and the American Bridge Company's Specification now in force.

The requirements other than the chemical and physical properties included in the specifications were not included in the table, as they can be more conveniently compared as follows:

Form of Test Specimens.

The first five specifications included in Table No. 1 specify the form of test specimen for determining the tensile tests of sheared plates, shown in the accompanying cut; allow parallel specimens when necessary, and specify that rivet rounds shall be tested of full size as rolled. The American Bridge Company's Specification states that the tensile strength, &c., "shall be determined from a standard test piece cut from the finished material of at least 1/2 inch square section."

"or defective edges." The American Bridge Company specify that "the finished bars, plates and snapes must be free from injurious seams, flaws or cracks and have a clean smooth finish."

All six specifications state that if the finished material is to be annealed, the test specimen must receive the same treatment before testing.

Allowable Variations in Weight.

The Railway Committee have adopted the standard permissible variations in the weight of sheared plates as revised by the Association of American Steel Manufacturers on April 19, 1902, and which are given in full in the text of the revised Manufacturers' Standard Specifications printed herewith.

The two I. A. T. M. Standard Specifications contain an older edition of this same table. The American Bridge Company Specification simply states that "A variation in cross section or weight of rolled material of more than 2 1/2 per cent. from that specified, may be cause for rejection."

Tests of Full Sized Eye Bars.

It will be noticed that the revised Manufacturers' Standard Specifications printed herewith omit the paragraph contained in the former edition of October 23, 1896, covering specified requirements on full sized tests of steel eye bars. The Manufacturers' Committee purposely omitted this paragraph in revising the specifications, because they considered it an injustice to hold the steel maker responsible after his eye bar material had been forged and annealed at the bridge shop.

Samples for Chemical Analysis.

The Railway Committee requires the manufacturer to furnish his analysis on drillings from the test ingot taken when pouring each melt of steel. They provide that check analyses shall be made from finished material if called for, in which case an excess of 25 per cent. above the required limits will be allowed. This is fair to both interests if the check analyses are made on the tensile test specimens, but if the inspector has the right to take his sample at any position from the plate, for instance drillings from the central top part of a plate coming from the top part of an ingot, a higher variation in phosphorus, and especially in sulphur, than 25 per cent. from the heat analysis might be found.

Open Hearth Plate and Rivet Steel.

In Table No. 2 a comparison is given of the physical and chemical properties specified for special open hearth

Table II.—Comparison of the Physical and Chemical Properties Specified for Open Hearth Plate and Rivet Steel.

	Association of American Steel Manufacturers. February 6, 1903.	Association of American Steel Manufacturers. October 23, 1896.	American Stand. Spec. I. A. T. M. August 10, 1901.
PHYSICAL PROPERTIES.			
Extra Soft Steel:			
Ultimate strength.....	45,000 to 50,000.....	45,000 to 55,000.....	45,000 to 55,000.
Elastic limit.....	One-half ultimate strength.....	One-half ultimate strength.....	One-half ultimate strength.
Elongation in 8 inches.....	28 per cent.....	28 per cent.....	28 per cent.
Cold and quench bends.....	180° flat.....	180° flat.....	180° flat.
Fire Box Steel:			
Ultimate strength.....	52,000 to 62,000.....	52,000 to 62,000.....	52,000 to 62,000.
Elastic limit.....	One-half ultimate strength.....	One-half ultimate strength.....	One-half ultimate strength.
Elongation in 8 inches.....	26 per cent.....	26 per cent.....	26 per cent.
Cold and quench bends.....	180° flat.....	180° flat.....	180° flat.
Flange or Boiler Steel:			
Ultimate strength.....	55,000 to 65,000.....	52,000 to 62,000.....	55,000 to 65,000.
Elastic limit.....	One-half ultimate strength.....	One-half ultimate strength.....	One-half ultimate strength.
Elongation in 8 inches.....	25 per cent.....	25 per cent.....	25 per cent.
Cold and quench bends.....	180° flat.....	180° flat.....	180° flat.
Boiler Rivet Steel.....	Use "Extra Soft Steel".....	Use "Extra Soft Steel".....	Use "Extra Soft Steel."
CHEMICAL PROPERTIES.			
Extra Soft Steel.....	{ Not over 0.04 % phosphorus. Not over 0.04 % sulphur.	{ Not over 0.04 % phosphorus. Not over 0.04 % sulphur.	{ Not over 0.04 % phosphorus. Not over 0.04 % sulphur. 0.30 to 0.50 % manganese. If acid not over 0.04 % phos. If basic not over 0.03 % phos.
Fire Box Steel.....	{ Not over 0.04 % phosphorus. Not over 0.04 % sulphur.	{ Not over 0.04 % phosphorus. Not over 0.04 % sulphur.	{ Not over 0.04 % sulphur. 0.30 to 0.50 % manganese. If acid not over 0.06 % phos. If basic not over 0.04 % phos.
Flange or Boiler Steel.....	{ Not over 0.06 % phosphorus. Not over 0.04 % sulphur.	{ Not over 0.06 % phosphorus. Not over 0.04 % sulphur.	{ Not over 0.05 % sulphur. 0.30 to 0.60 % manganese.

Marking Finished and Annealed Material.

The first five specifications state that the finished material must be stamped with the heat number, and that it shall be "free from injurious seams, flaws or cracks and have a workmanlike finish." The railway specification adds after the word "cracks" the words

plate and rivet steel, including extra soft steel, fire box steel, flange or boiler steel and boiler rivet steel.

For these steels the table shows a comparison of the two editions of the specifications of the steel manufacturers, with the American Standard Specifications of I. A. T. M. of August 10, 1901.

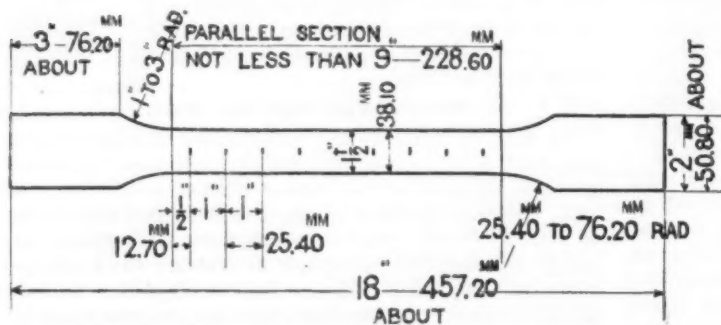


The chief point to be noted in this comparison is that the steel manufacturers have agreed on a steel for boilers of the same range in ultimate strength, 55,000 to 65,000 pounds, as specified for railway bridges.

**Standard Specifications Covering the Chemical and Physical Properties of Structural and Special Open Hearth Plate and Rivet Steel, as Adopted by the Association of American Steel Manufacturers on August 9, 1885; Revised February 17, 1896; October 23, 1896; April 19, 1902, and February 6, 1903.**

#### STRUCTURAL STEEL.

1. Steel may be made by either the open hearth or Bessemer process.
2. All tests and inspections shall be made at the place of manufacture prior to shipment.
3. The tensile strength, limit of elasticity and ductility shall be determined from a standard test piece cut from the finished material. The standard shape of the test piece for sheared plates shall be as shown by the following sketch:



PIECE TO BE OF SAME THICKNESS AS THE PLATE.

On tests cut from other material the test piece may be either the same as for sheared plates, or it may be planed or turned parallel throughout its entire length, and in all cases where possible two opposite sides of the test piece shall be the rolled surfaces. The elongation shall be measured on an original length of 8 inches, except as modified in section 12, paragraph c. Rivet rounds and small bars shall be tested of full size as rolled.

Two test pieces shall be taken from each melt or blow of finished material, one for tension and one for bending; but in case either test develops flaws, or the tensile test piece breaks outside of the middle third of its gauged length, it may be discarded and another test piece substituted therefor.

4. Material which is to be used without annealing or further treatment shall be tested in the condition in which it comes from the rolls. When material is to be annealed or otherwise treated before use, the specimen representing such material shall be similarly treated before testing.

5. Every finished piece of steel shall be stamped with the blow or melt number, and steel for pins shall have the blow or melt number stamped on the ends. Rivet and lacing steel, and small pieces for pin plates and stiffeners, may be shipped in bundles securely wired together, with the blow or melt number on a metal tag attached.

6. Finished bars shall be free from injurious seams, flaws or cracks, and have a workmanlike finish.

- 7a. Steel for buildings, train sheds, highway bridges and similar structures. Maximum phosphorus, 0.10 per cent.
  - 7b. Steel for railway bridges. Maximum phosphorus, 0.08 per cent.
8. Structural steel shall be of three grades, Rivet, Railway Bridge and Medium.

#### RIVET STEEL.

9. Ultimate strength, 48,000 to 58,000 pounds per square inch.
- Elastic limit, not less than one-half the ultimate strength.
- Percentage of elongation,  $\frac{1,400,000}{\text{ultimate strength}}$
- Bending test, 180 degrees flat on itself, without fracture on outside of bent portion.

#### STEEL FOR RAILWAY BRIDGES.

10. Ultimate strength, 55,000 to 65,000 pounds per square inch.
- Elastic limit, not less than one-half the ultimate strength.
- Percentage of elongation,  $\frac{1,400,000}{\text{ultimate strength}}$
- Bending test, 180 degrees to a diameter equal to thickness of piece tested, without fracture on outside of bent portion.

#### MEDIUM STEEL.

11. Ultimate strength, 60,000 to 70,000 pounds per square inch.
- Elastic limit, not less than one-half the ultimate strength.
- Percentage of elongation,  $\frac{1,400,000}{\text{ultimate strength}}$
- Bending test, 180 degrees to a diameter equal to thickness of piece tested, without fracture on outside of bent portion.
12. For material less than 5-16 inch and more than  $\frac{3}{4}$  inch

in thickness the following modifications shall be made in the requirements for elongation:

- a. For each increase of  $\frac{1}{4}$  inch in thickness above  $\frac{3}{4}$  inch a deduction of 1 per cent. shall be made from the specified elongation, except that the minimum elongation shall be 20 per cent. for eye bar material and 18 per cent. for other structural material.
  - b. For each decrease of 1-16 inch in thickness below 5-16 inch a deduction of 2½ per cent. shall be made from the specified elongation.
  - c. In rounds of  $\frac{3}{4}$  inch or less in diameter the elongation shall be measured in a length equal to eight times the diameter of section tested.
  - d. For pins made from any of the before mentioned grades of steel the required elongation shall be 5 per cent. less than that specified for each grade, as determined on a test piece, the center of which shall be 1 inch from the surface of the bar.
13. The variation in cross section or weight of more than 2½ per cent. from that specified will be sufficient cause for rejection, except in the case of sheared plates, which will be covered by the following permissible variations:

a. Plates 12½ pounds per square foot or heavier, up to 100 inches wide, when ordered to weight, shall not average more than 2½ per cent. variation above or 2½ per cent. below the theoretical weight. When 100 inches wide and over, 5 per cent. above or 5 per cent. below the theoretical weight.

b. Plates under 12½ pounds per square foot, when ordered to weight, shall not average a greater variation than the following:

Up to 75 inches wide, 2½ per cent. above or 2½ per cent. below the theoretical weight; 75 inches wide up to 100 inches wide, 5 per cent. above or 3 per cent. below the theoretical weight; when 100 inches wide and over, 10 per cent. above or 3 per cent. below the theoretical weight.

c. For all plates ordered to gauge there will be permitted an average excess of weight over that corresponding to the dimensions on the order equal in amount to that specified in the following table:

Table of Allowances for Overweight for Rectangular Plates When Ordered to Gauge.

Plates will be considered up to gauge if measuring not over 1-100 inch less than the ordered gauge. The weight of 1 cubic inch of rolled steel is assumed to be 0.2833 pound.

#### PLATES $\frac{1}{4}$ INCH AND OVER IN THICKNESS.

Thickness of plate. Inch.	Width of plate.			
	Up to 75 inches. Per cent.	75 inches to 100 inches. Per cent.	Over 100 to 115 inches. Per cent.	Over 115 inches. Per cent.
$\frac{1}{4}$	10	14	18	..
5-16	8	12	16	..
$\frac{3}{8}$	7	10	13	17
7-16	6	8	10	13
$\frac{1}{2}$	5	7	9	12
9-16	4½	6½	8½	11
$\frac{3}{4}$	4	6	8	10
Over $\frac{3}{4}$	3½	5	6½	9

#### PLATES UNDER $\frac{1}{4}$ INCH IN THICKNESS.

Thickness of plate. Inch.	Width of plate.		
	Up to 50 inches. Per cent.	50 inches to 70 inches. Per cent.	Over 70 inches. Per cent.
$\frac{1}{8}$ up to 5-32	10	15	20
mfwp	10	12½	17
3-16 up to $\frac{1}{4}$	7	10	15

#### STRUCTURAL CAST IRON.

1. Except when chilled iron is specified, all castings shall be tough gray iron, free from injurious cold-shuts or blow-holes, true to pattern and of a workmanlike finish. Sample pieces 1 inch square, cast from the same heat of metal in sand molds, shall be capable of sustaining on a clear span of 4 feet 8 inches a central load of 500 pounds when tested in the rough bar.

#### SPECIAL OPEN HEARTH PLATE AND RIVET STEEL.

1. All tests and inspections shall be made at the place of manufacture prior to shipment.

2. The tensile strength, limit of elasticity and ductility shall be determined from a standard test piece cut from the finished material. The standard shape of the test piece for sheared plates shall be as shown by the sketch under structural steel.

On tests cut from other material the test piece may be either the same as for sheared plates, or it may be planed or turned parallel throughout its entire length, and in all cases where possible two opposite sides of the test piece shall be the rolled surfaces. The elongation shall be measured on an original length of 8 inches, except as modified in section 12, paragraph c. Rivet rounds and small bars shall be tested of full size as rolled.

Four test pieces shall be taken from each melt of finished material, two for tension and two for bending; but in case either test develops flaws, or the tensile test piece breaks outside of the middle third of its gauged length, it may be discarded and another test piece substituted therefor.

3. Material which is to be used without annealing or further treatment shall be tested in the condition in which it comes from the rolls. When material is to be annealed or otherwise treated before use, the specimen representing such material shall be similarly treated before testing.

4. Every finished piece of steel shall be stamped with the melt number. Rivet steel may be shipped in bundles securely wired together, with the melt number on a metal tag attached.

5. All plates shall be free from injurious surface defects and have a workmanlike finish.

6a. Flange or boiler steel. { Maximum phosphorus, 0.06 per cent.  
Maximum sulphur, 0.04 per cent.

6b. Extra soft and fire box steel. { Maximum phosphorus, 0.04 per cent.  
Maximum sulphur, 0.04 per cent.

7. Special open hearth plate and rivet steel shall be of three grades, Extra Soft, Fire Box and Flange or Boiler Steel.

EXTRA SOFT STEEL.

8. Ultimate strength, 45,000 to 55,000 pounds per square inch.

Elastic limit, not less than one-half the ultimate strength.

Elongation, 28 per cent.

Cold and quench bends, 180 degrees flat on itself, without fracture on outside of bent portion.

FIRE BOX STEEL.

9. Ultimate strength, 52,000 to 62,000 pounds per square inch.

Elastic limit, not less than one-half the ultimate strength.

Elongation, 26 per cent.

Cold and quench bends, 180 degrees flat on itself, without fracture on outside of bent portion.

FLANGE OR BOILER STEEL.

10. Ultimate strength, 55,000 to 65,000 pounds per square inch.

Elastic limit, not less than one-half the ultimate strength.

Elongation, 25 per cent.

Cold and quench bends, 180 degrees flat on itself, without fracture on outside of bent portion.

11. Steel for boiler rivets shall be made of the extra soft grade specified in paragraph No. 8.

12. For material less than 5-16 inch and more than 3/4 inch in thickness the following modifications shall be made in the requirements for elongation:

a. For each increase of 1/8 inch in thickness above 3/4 inch a deduction of 1 per cent. shall be made from the specified elongation.

b. For each decrease of 1-16 inch in thickness below 5-16 inch a deduction of 2 1/2 per cent. shall be made from the specified elongation.

c. In rounds of 3/8 inch or less in diameter the elongation shall be measured in a length equal to eight times the diameter of section tested.

13. The variation in cross section or weight of more than 2 1/2 per cent. from that specified will be sufficient cause for rejection, except in the case of sheared plates, which will be covered by the following permissible variations:

a. Plates 12 1/2 pounds per square foot or heavier, up to 100 inches wide, when ordered to weight, shall not average more than 2 1/2 per cent. variation above or 2 1/2 per cent. below the theoretical weight. When 100 inches wide and over, 5 per cent. above or 5 per cent. below the theoretical weight.

b. Plates under 12 1/2 pounds per square foot, when ordered to weight, shall not average a greater variation than the following:

Up to 75 inches wide, 2 1/2 per cent. above or 2 1/2 per cent. below the theoretical weight; 75 inches wide up to 100 inches wide, 5 per cent. above or 3 per cent. below the theoretical weight; when 100 inches wide and over, 10 per cent. above or 3 per cent. below the theoretical weight.

c. For all plates ordered to gauge there will be permitted an average excess of weight over that corresponding to the dimensions on the order equal in amount to that specified in the following table:

Table of Allowances for Overweight for Rectangular Plates When Ordered to Gauge.

Plates will be considered up to gauge if measuring not over 1-100 inch less than the ordered gauge. The weight of 1 cubic inch of rolled steel is assumed to be 0.2833 pound.

PLATES 3/4 INCH AND OVER IN THICKNESS.

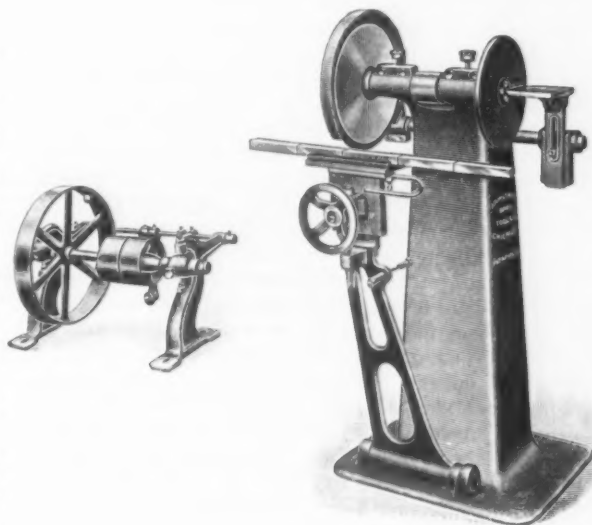
Thickness of plate. Inch.	Width of plate.			
	Up to 75 inches. Per cent.	75 inches to 100 inches. Per cent.	Over 100 to 115 inches. Per cent.	Over 115 inches. Per cent.
1/4	10	14	18	..
5-16	8	12	16	..
3/8	7	10	13	17
7-16	6	8	10	13
1/2	5	7	9	12
9-16	4 1/2	6 1/2	8 1/2	11
5/8	4	6	8	10
Over 3/2	3 1/2	5	6 1/2	9

PLATES UNDER 3/4 INCH IN THICKNESS.

Thickness of plate. Inch.	Width of plate.		
	Up to 50 inches. Per cent.	50 inches to 70 inches. Per cent.	Over 70 inches. Per cent.
1/8 up to 5-32	10	15	20
5-32 up to 3-16	8 1/2	12 1/2	17
3-16 up to 1/4	7	10	15

The Armstrong Cutting Off Machine.

In the manufacture of their tool holders the Armstrong Bros. Tool Company of 617 Austin avenue, Chicago, find it necessary to cut large quantities of self hardening steel into cutter lengths. Their experience has taught them that this class of steel gives best satisfaction when cut off cold. The ordinary shop practice has been to cut the steel off hot or to break it off on the anvil. The objection to the latter method is that the break is liable to be very irregular, resulting not only in a serious loss of steel, but also in vastly increased grinding, with attendant waste of time and emery wheels. After experimenting with various methods of doing this work the company developed the machine illustrated, which in a slightly different form has been in use in their works for about two years, giving perfect satisfaction, and with practically no expense for maintenance. The cutting is done by a disk of special grade tool steel revolving at high speed. Any attempt to cut soft steel or ordinary cast steel with a disk results in a rough dragging cut, with flaring lips, which bind the disk to such an extent as to reduce its speed to a point where it is



THE ARMSTRONG CUTTING OFF MACHINE.

ineffective, if it does not actually bend or break the disk. Owing to the peculiar nature of self hardening steel, however, it is not affected in this manner by the cutting disk, which makes in it, even when forced hard, a clean, clear cut incision. The periphery of the disk is coated with self hardening steel particles, and these particles do the actual cutting.

It will be observed that the machine is of combination form, the steel cutting disk being mounted on one end of the spindle, while the other end of the spindle carries a 12-inch grinding disk. The speed at which the machine is intended to run is such as to give the best results for both operations. The spindle is of tool steel ground true. The bearings are cast iron and are dust proof, with convenient and positive adjustment for wear and to take up lost motion. The swinging table is provided with a length gauge and is conveniently adjustable for steel of different sizes or depth of cut. The cutting disk is provided with a neat guard which can easily be swung back out of the way when changing the disk. The grinding disk is made of boiler plate and is provided with an adjustable table so located that the operator may cut off long bars of steel.

The regular meeting of the Western Society of Engineers was held Wednesday evening, April 29, in the society rooms, Monadnock Block, Chicago. The subject of the evening was "Borings on the Isthmus of Panama for the Bohlo Dam," the paper having been prepared by R. C. Smith. On April 15 the society listened to a paper by Richard McCulloch, entitled "Notes on European Tramway Practice." On May 6 the subject for consideration will be "Railway Maintenance," by H. J. Slifer.



## Chill Rolls.— II.

### The Problems of Their Manufacture and Use.

BY B. E. V. LUTY.

#### Heat Strains.

Internal strains in the chill roll may come from two causes:

1. Variations in the coefficient of heat expansion in different parts of the roll.
2. Variations in temperature in different parts of the roll.

As to the first little need be said. Some claim that since the expansion of steel by heat is greater than that of cast iron, so the expansion of the chill, which the metallographists tell us cannot be distinguished structurally from very hard steel, must be greater than that of the gray iron. The writer knows of but one experiment made directly on a chill roll, and that one showed a very slightly smaller coefficient in the chill as compared with the gray iron. So the evidence is very inconclusive, and in any case the point, while important, is much less so than that of differences in temperature.

When work is begun in the sheet or tin mill it is necessary to heat up the rolls, and this is done gradually. Artificial heating may be practiced, followed by actual rolling, the rule being to start with narrow orders, so as to heat the central portions of the surface more than the ends. When the rolls have reached their normal condition the temperature is greater through the central cross section than through the ends, and this condition is allowed for by turning one of the rolls "hollow," so that the central diameter is less than that of the ends.

The temperature of the roll depends on the relation between the rate of heat reception and the rate of heat loss. Whenever more heat is received than is lost the temperature rises, and *vice versa*. The rate of heat transfer depends on the difference of temperature between the contiguous surfaces, other factors being uniform in most cases. Assuming a temperature of 1200 degrees F. for the steel being rolled, and a temperature of 100 degrees F. for the air, the roll starting at this latter temperature, the difference between hot steel and roll is 1100 degrees F., and heat passes to the roll at a certain rate, while the roll loses none at all. Its temperature rises rapidly. Later, when the roll temperature has reached 650 degrees F. the difference is 550 degrees F. between steel and roll, or half as much as before, and the roll receives heat half as fast. At the same time it is now radiating heat at a rapid rate, due to the difference of 550 degrees F. between roll and surrounding air. At some time a balance is reached, because the rate of heat reception decreases as the rate of radiation increases until they are equal. Future variations in roll temperature depend on changes in the rate of heat reception, from differences in the temperature of the steel rolled, or the rate at which it is passed between the rolls.

What applies to the roll as a unit applies also to any given portion, except that such portion may lose heat by conduction to adjacent portions, instead of by radiation to the air, or may gain heat from adjacent portions instead of direct from the steel. Thus the surface of the roll, except toward the ends, loses heat not only to the air, but to the interior portions.

In regular work there may also be, in addition to the heat lost directly to the air, a flow of heat to the necks, if they are provided with artificial cooling means. Otherwise, the heat generated in the necks is sufficient to establish a neutral surface somewhere between the bearing surface and the central portion of the roll, through which no heat passes. It is convenient and sufficient for the present at least to assume that no heat passes between body and neck in either direction. Then there is being received on a belt around the roll, as wide as the pack being rolled, a certain quantity of heat in each unit of time, while in an equal unit of time the same quantity of heat is being radiated from the entire surface of the roll body, including its entire cylindrical surface and the annulus at each end surrounding the neck. As the whole surface is radiating, and only a portion receiving heat, it

is obvious that a portion of the total heat is conducted through the substance of the roll toward the end portions. Neglecting as minor details the facts that the central portion of the roll's surface receives a little less heat proportionately than the portions near the edges of the pack, and that the end portions of the roll body radiate less heat than the central portions, all on account of the minor differences in temperature, the path of the heat from the center to the end of the rolls can be studied, it depending simply on the difference in temperature between any two contiguous points in the substance which may be selected. The coefficient of heat conductivity is the same throughout the roll, so that the flow depends directly on the difference in temperature.

Our method of analysis at once shows up a popular fallacy. Inasmuch as the surface temperature falls off from the middle to the end of the roll, it has been assumed that the temperature at any point in a given cross section is the same. Rolls have therefore been calipered, when hot, to determine by the difference in diameter at different points in the length as compared with the diameter when cold what difference in temperature exists between the center and end portions. Such reasoning is incorrect, and deductions from measurements of diameters are wrong. The central portions of the middle cross section of the roll are receiving heat from the outer portions of the same cross section, and passing this heat in an approximately longitudinal direction toward the end portions. These latter portions pass the heat outward toward the roll surface not in contact with hot steel. Thus, taking a cross section at the longitudinal center of the roll, the central portions of this section are cooler than the outlying portions, while taking a section toward the end of the roll, the central portion of such section is hotter than the outlying portions.

The decline in temperature as we pass along the roll's axis from the center to the end is more gradual than the decline along the surface from center to end. The difference in temperature of cross section between center and end, as determined by calipering, represents only the average difference, the difference in surface temperature being greater than the average.

#### Studying Heat Strains.

We are now prepared to study some of the heat strains which occur in chill rolls in actual use. The first case taken will be the one just referred to, not on account of its importance, but because it can be so easily studied, that it forms a fitting introduction, and because it illustrates the peculiar fact that a heat strain can actually increase the strength of the roll in service.

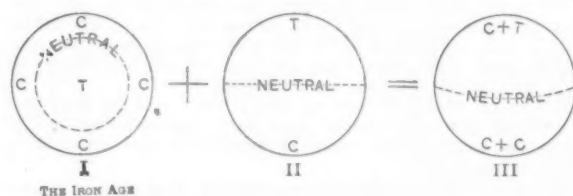


Fig. 1.—Heat Strains Shown Diagrammatically.

Fig. 1 shows diagrammatically the nature and practical effect of this strain. The circles represent the cross section of the roll through its longitudinal center. The letters C and T represent compression and tension, but not any definite values of either. In I is shown the roll when subject only to the heat strain in question. As the central portion of the section is cooler than the outer portion, the former is in tension while the latter is in compression, the former is in tension while the latter is in compression, separates them. In II is represented a roll subject to no internal strain, but subject to the strain of rolling metal, this being equal to an upward pressure acting on a beam. If the modulus of elasticity be the same in compression as in tension, the neutral axis passes horizontally through the center. The lower semicircle is in compression and the upper in tension. When the roll is in use the actual condition will be the sum of I and II, represented in III. Here the upper portion of the section has the tension of II diminished by the com-



pression of I, while the lower portion has the sum of the compressions of I and II. This influence depresses the neutral axis in the center, but owing to the compression at the sides in I, the line is not depressed as much at the ends as the center, if at all, hence a curved form results.

Now in III, the actual roll in use, the greatest fiber tension is at the top, and the greatest fiber compression is at the bottom. The former is less than existed in II, while the latter is greater. Inasmuch as the resistance of cast iron to compression is two or three times greater than its resistance to tension, the roll does not suffer by the increased compression at the bottom, while it is relieved by the decreased tension at the top. Thus we have the interesting case of a roll being actually strengthened for actual work by the existence of a heat strain. We reiterate that the influence of this particular heat strain is unimportant, but its existence is undoubted, and its peculiar influence is worthy of note.

Toward the ends of the roll body there is a heat strain of the opposite nature, the central portion of the cross section being slightly in compression, other things being equal, and the outer portion in tension. This strain is absolutely negligible, exerting no influence which need be considered.

We now come to the important heat strain, which is that produced by too rapid heating or cooling of the roll. If the roll is in ordinary working condition, and operations be suddenly suspended, the radiation of heat continues at an unaltered rate, while as no heat is now being imparted to the roll, its temperature at once falls at the surface, the interior portions gradually losing heat to the surface, which remains at a lower temperature than the interior until the whole roll has reached the temperature of the surrounding atmosphere.

If, on the other hand, the ordinary rate of rolling, with a roll in normal condition, be suddenly increased, the surface is made hotter than the interior, and remains so until the interior has been brought up to the new temperature.

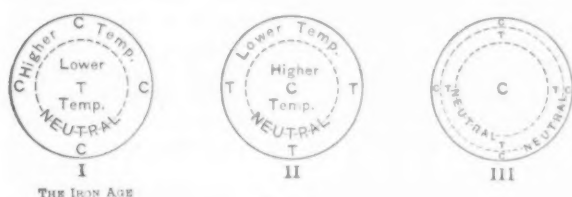


Fig. 2.

In Fig. 2 Diagrams I and II illustrate these two cases. In I is shown the central cross section of a roll as it is being heated at the beginning of work. The temperature gradually decreases from the outside to the inside. The outer portions are in compression and the inner in tension, the one shading into the other on the neutral line. In II is shown a heated roll which is cooling, the influence being reversed. The sum of the moments of compression must equal the sum of the moments of tension in any case, and as the metal's power to resist permanent deformation is much greater for compression than for tension, it is the area in tension which must be particularly watched. Only in an extreme case, where a small area in compression balanced a much larger area in tension, would the compression per square inch amount to sufficient to cause trouble.

These two diagrams explain clearly what is observed in actual practice. A roll allowed to cool is not ordinarily in danger of breakage, because no mechanical strain from rolling is added to the internal heat strain. Furthermore, a roll can be heated more rapidly at the beginning of the week than it cools at the close of the week, although in the first case there is the added mechanical strain. This is due simply to the fact that the strain of rolling produces tension in the outermost part of the roll, at the top of the top roll or the bottom of the lower roll. In II, where the roll is being heated, this tension and the compression due to the heat strain tend to neutralize each other, decreasing the maximum fiber stress in the roll.

Should it occur—ordinarily it does not—that while the roll is cooling, and is in the condition of Diagram

II, it is subjected to the strain of rolling, rupture is likely to occur, because the tension in the extreme portion of the section produced by rolling is added to the tension produced by the heat strain. A case in point may be cited: In the end mill of a certain train a series of roll breakages occurred which the management could not understand, and the roll maker was called in. As he and the manager stood watching the mill the latter drew his overcoat more tightly about him when a blast of cold air struck him from a large opening in the end of the building. The roll maker remarked that the roll was as sensitive to such a blast of cold air as was the manager, and advised closing the opening. This was done, and no further trouble was experienced.

The fact here was that a sudden inrush of cold air produced the heat strain shown in II, the tension in the outermost portion being the sum of the tension produced by sudden cooling and by rolling at the same time, the sum being too great for the metal, starting a crack.

After the roll has been heated and is in normal working order it is ordinarily impossible to break it by the class of strain shown in I. To produce as great an internal strain in this case as is produced in the opposite direction by the sudden cessation of work, as shown in II, it would be necessary to double the rate of working, which would not ordinarily occur.

Practical experience shows that the greatest care must be exercised in the case where the roll has been idle for a period through some contingency and work is resumed. The resumption of work must be very gradual. Diagram III of Fig. 2 shows clearly why this is the case. While the roll has been cooling the condition in II has been produced. The resumption of work adds the tension of rolling in the outermost fibers to the tension of the heat strain, which is dangerous in itself, but in addition a very narrow band on the outside is suddenly heated, either putting it in compression or reducing its former tension. In either case the tension just inside of this band is increased, as it has proportionately more compression to balance. That these two outer bands are comparatively small is shown by the fact that it takes something like a day for a roll to become absolutely cold, while in a very short time the surface drops 200 or 300 degrees in temperature, indicating a slow rate of heat transfer from one portion to another. While the roll has been cooling through an interruption to work, therefore, the cooling influence has penetrated to but a slight depth, while the heat from the resumption of work at first penetrates a still slighter depth, thus massing the strains near the surface, where the strains from the actual rolling are most severe.

#### The Force of Heat Strains.

The stresses produced in the metal of the roll by these variations of temperature are subject to very simple mathematical investigation, and the point of breakage may be readily determined.

If a metal be subjected to a force tending to compress or extend it, it will yield in proportion to such force, up to a point which the French call the "limit of proportionality," lying somewhere below the elastic limit. The modulus of elasticity, sometimes called Young's modulus, is the pressure per square inch in pounds which would reduce the metal to one-half its original length, or the amount of pull which would double the original length, on the supposition that such compression or tension could be continued to such a point. The modulus for soft steel is generally assumed at 29,000,000 pounds, in calculating the deflection of steel beams, &c., which means that a piece of steel 1 inch in cross section, if subjected to a pull or pressure of 29,000 pounds, would change its length by one-thousandth. Various determinations of the modulus of cast iron have been made, which do not agree, probably because different grades of iron were used. We can assume a modulus of 17,000,000 pounds as being safe.

The linear expansion of cast iron by heat is approximately 0.0000062 per degree Fahrenheit. Multiplying the modulus by this decimal, we have approximately 100 pounds per square inch, which is the amount of tensile or compressive force which would be required to produce the same change in length as a change of 1 degree in temperature, or, conversely, if a bar of cast iron, 1 inch

in cross section and of any length, were held rigidly at its ends, and the temperature changed by 1 degree, it would be in compression or tension to the extent of 100 pounds. If we assume a tensile strength of 20,000 pounds, then a drop in temperature of 200 degrees F. would be sufficient to cause rupture. In compression about five times this amount would be required to cause deformation.

Assume two bars, each of 1 square inch cross section, rigidly fastened together at the ends, without stress when at the same temperature. Then if a difference in temperature is produced, the colder will be in tension and the hotter in compression. The two forces will necessarily balance, and the cross sections being equal, the stress per square inch will also be equal. Let one be larger than the other, then the stress per square inch will be larger in the smaller bar and smaller in the larger one. If one be indefinitely large, the total stress is in the smaller one, being, with a difference of 200 degrees, about 20,000 pounds. If the stress be equally divided a difference of 400 degrees is required to produce a stress of 20,000 pounds per square inch in each.

Referring again to the diagrams in Fig. 2, we note that in III, the case where a roll has cooled for a short time and work has suddenly been resumed, the area in tension is small relatively to the inner and outer portions, which are hotter and therefore in compression, to such an extent that if a difference of 200 degrees exists it produces a strain of nearly 20,000 pounds per square inch, which may be sufficient for rupture. A crack starts in this portion, which may extend at once to the whole roll, or may await a different set of conditions when the roll gives way. Cracks which have started on the surface may be observed before the roll has broken, or if the roll has not been scrutinized from time to time the fractured surface of the broken roll will ordinarily show by oxidation if a portion of the crack is old. If the original crack was in the interior, however, it is very doubtful whether it will present an appearance different from the more recently fractured portion.

The case presented in III of Fig. 2 is one particularly liable to cause a crack, because the compressed metal causing tension lies on both sides of the tension region. In cases I and II there is such a gradual shading from tension to compression that the strain on the roll is not nearly so severe. This explains very clearly why a roll may be allowed to cool indefinitely in the open air without danger, or may be heated with equal rapidity when work is begun on a cold roll, while the greatest care must always be exercised with a roll which has cooled a short time when work is resumed. Practice has demonstrated this to the satisfaction of every competent roller or mill manager.

In the above investigations we have considered tension or compression as acting in one direction only. As a matter of fact they act in all directions. We do not know what the resistance of cast iron is to a force acting in three directions at right angles to each other, or even to a force acting in two directions. It may be that a piece pulled with a force of 20,000 pounds per square inch would not be able to stand at the same time a similar force acting in the other two directions, at right angles to each other, and in a plane perpendicular to the line of the first tension. It may therefore be that the actual strength of the roll is somewhat less than is indicated by the above reasoning.

Other cases of internal heat strains in rolls could be investigated by the method outlined, but the most interesting and important cases have been taken up. We now pass to another phase of the subject.

#### Casting Strains in Chill Rolls.

In discussing heat strains no reference has been made to possible casting strains in the roll as it comes from the foundry. Such strains exist, however, and in a general way weaken the roll. It would be natural to assume that they exist, since they are admitted to be present in all unannealed sand castings, and to a minor extent in those which have been annealed. In the case of a chill roll, the chill sets instantly as the metal is poured, while the interior remains fluid for a long time, then becomes elastic and finally solid, ultimately cooling to the tem-

perature of the surrounding air. First comes shrinkage during solidification, and then ordinary contraction. During the whole process the interior of the roll is hotter than the exterior, in varying degrees.

The nature of the strain is open to little question. We know that the roll after it has been cast, being continually hotter along its central axis than on the exterior, would naturally be in a state of tension along this axis when cold. A further indication is that it ought to be possible to heat a roll much more rapidly than it can be cooled, when in the mill, and this is not the case, as the danger of breaking rolls when starting work is considerable, while no care at all is exercised in cooling, except to taper the work off a little.

#### Experiment Showing Casting Strain.

While there is a *priori* indication of casting strain in a chill roll, the writer some time ago desired to prove the matter, and suggested to a prominent roll maker the advisability of making the actual test. This was done and proved the contention fully as regards the particular roll investigated, which had been selected for the experiment as being a perfectly normal one. The procedure was as follows:

A ring was cut from the central portion of the 26-inch roll, the ring being about  $\frac{1}{2}$  inch thick and about  $1\frac{1}{4}$  inches wide. The chill in this roll was about  $\frac{7}{8}$  inch deep, and the width was taken at  $1\frac{1}{4}$  inches in order to embrace an equal amount of gray iron with the chill. The ring is shown in Fig. 3. Two punch marks were made on the chill exactly 2 inches apart. The ring was cut through, between the marks, and they were then found to have approached each other 7-16 inch. I shows the ring before cutting and II after cutting.

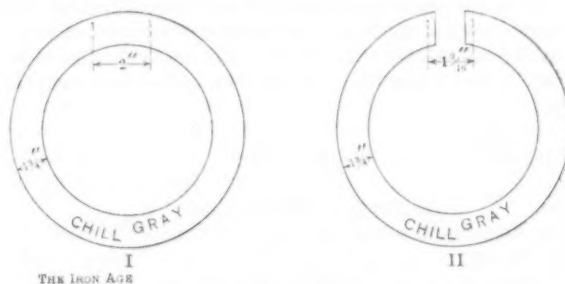


Fig. 3.—I. Ring Before Cutting. II. Ring After Cutting.

If one imagines this ring unrolled into a straight bar he will see that should one side contract, as it would if tending to relieve a state of tension, the bar would become concave on that side. When the piece is in the form of a ring the same action makes the inside more concave, shown in the closing up by 7-16 inch after the cut was made. A curious feature in the experiment, illustrating this tension on the inner side further, was that as the planer tool began to cut from the inside the sides of the cut tended to recede, relieving the tension in the immediate neighborhood. When the chill was also cut through there was a general partial relief to the tension. Whether this state of tension extended clear to the center of the roll the experiment did not show, but it is reasonable to assume that it did, although probably it was emphasized at the point where the gray iron joins the chill.

If the general casting strain puts the extreme outer portion of the roll in a state of compression and the inner portions in a state of tension, the condition of the roll when cold would be as in I of Fig. 2. Making the outside of the roll hotter than the inside would increase both tension and compression in their respective areas, thus making the roll weaker. Making the roll cooler on the outside than the inside, on the other hand, would tend to relieve the strain, and there is thus furnished another reason why it is more dangerous to heat a roll than to cool it.

#### General Deductions.

When one considers the casting strains which naturally exist in rolls as they are now made, and the extreme sensitiveness of the roll to heat strains in ordinary practice, together with the abuses of rolling steel too cold or



of giving the pair of rolls too much draft, the wonder is not that rolls break, but that so many of them stand the service and wear out. It speaks well for the quality of the iron used, although it is by no means a fact that it is absolutely the best that can be obtained. Better iron would mean a higher price for finished rolls.

A change in temperature of 200 degree F. corresponds to a stress of 20,000 pounds per square inch. If but a small portion of the roll is 200 degrees cooler than the balance of the roll, it must stand the whole of the strain and is in tension close to the breaking point. If the cooler volume bears a considerable ratio to the remaining hotter volume, there is relief by the hotter portion being put in compression, a difference of 400 degrees corresponding to 20,000 pounds per square inch tension in one region balanced by the same compression in another and equal region.

That differences in temperature of from 200 to 400 degrees are met in practice without producing rupture is not denied, but the roll is saved in one of three ways:

1. By the hotter portion merging gradually into the cooler portion, allowing of a deformation of the whole roll body, as when the outside is cooler than the inside and the actual length of the roll body is less on the outside than it is along the center.

2. By some casting strain which acts in an opposite direction to the heat strain.

3. By the tensile strength being greater than 20,000 pounds per square inch.

A roll may be broken by a strain much under its theoretical limit of endurance, or, rather, what its strength should be when new. The roll maker is prone to hold the view that if a roll withstands ordinary service for a fortnight its breakage later must have been due to carelessness. This is not correct in the way the statement is generally taken. We have seen that in the regular life of a roll its outermost portions are subjected to alternate tension and compression about 4,000,000 times. If these strains were but a fraction of the theoretical limit, their continued repetition might still break the roll. Yet it is accepted that an old roll will stand certain abuse which a new roll will not. As in some particulars it is weaker than it was, it follows, if this accepted view is correct, that in certain other particulars the roll was weaker when new than would be expected in a normal casting, a matter that should be sifted further.

#### Opportunity for Further Study.

The progress that has been made in the manufacture and subsequent care of chill rolls has been almost wholly of the cut and try order. Very little has been done in the way of investigating either the physical characteristics of the metal used or the strains to which the roll is subjected in actual use. Much could be learned by actual experiments, either with test bars or with actual rolls. Amplifications could be made of the experiment already cited, showing the casting strains in rolls which have rendered good service and in others which have failed. It might even be possible, as a result of further investigation, to formulate some test which could be applied to a broken roll on which the user claimed an allowance by which it would be determined whether such claim were just or not. Such test might take the form of an examination for a casting strain beyond a certain allowed limit and a test of the tensile strength.

The coefficient of heat expansion is known to be slightly greater for steel than for cast iron. There is a very close approach between white cast iron and very hard steel; in fact, microscopic investigation of etched specimens, which permits of determining very accurately the amount of carbon and the proportion of hardening carbon, &c., shows absolutely no difference between white cast iron and high carbon steel. It is possible, therefore, that the coefficient of heat expansion of the chill portion is different from that of the gray portion, and possibly that it is different in different directions. The single experiment cited showed no great difference in one direction, but a single experiment is not enough. The tensile strength of chill and gray portions could well be investigated.

It would also be possible to determine without much

difficulty approximately how fast heat flows from one portion of the roll to another, and by this means throw light on how fast a roll may be heated or cooled in service.

We might summarize the physical characteristics which first deserve to be studied as follows:

1. Tensile strength; *a*, of the gray iron; *b*, of the chill longitudinally of the roll.

2. Compressive strength of gray iron and chill similar to 1.

3. Modulus of elasticity, in both compression and tension, of both gray iron and chill.

4. Rate of heat conductivity of both gray and chill iron, the latter radially of roll.

5. Rate, in proportion to the difference in the temperature, of heat transfer from hot steel to chill roll surface, and from chill roll surface to surrounding air, noting particularly in the latter case the influence of air circulation.

6. The number of alternations of tension and compression at various points below the elastic limit required to produce rupture, for both gray and chill portions.

Contemporaneous with such a study of physical characteristics of the iron in chill rolls, as they actually are made, there should be a study of the casting strains produced in rolls under present methods.

The information furnished by such studies would lay a ground work for intelligent experiment as to the best methods of improving the character of chill rolls and their proper handling in use, indicating the kind of abuse they can stand and the kind which should be particularly avoided.

#### Prizes for Workmen's Suggestions.

It is a pleasure to present the following account of a prize system in vogue at the manufacturing plant, at Dover, N. J., of the Richardson & Boynton Company of 234-238 Water street, New York, copies of which have been distributed among their employees. This is a step in the right direction, as it encourages an enterprising interest in everyday work that cannot but leave its impress for good on the business of the concern from every point of view. We congratulate the company on their generosity and the employees on their opportunities. The scheme is one that could be adopted in many plants with advantage:

The Richardson & Boynton Company of Dover, N. J., offer the following 20 prizes for the best suggestions offered by any of their employees in writing, between now and November 1, 1903:

First prize.....	\$50.00 in gold coin.
Second prize.....	35.00
Three prizes.....	25.00 each.
Five prizes.....	15.00 each.
Ten prizes.....	10.00 each.

Locked suggestion boxes will be placed in each department and opened twice a week. All suggestions to be in writing and signed.

We want all our employees to feel that they can make suggestions freely without fear or hindrance, or in any way injuring themselves in the estimation of the superintendent of their department. On the contrary, every good, practical suggestion made will help the standing of the one so making it in his department, as well as with the concern.

Examine the work that you are doing and see if you think of any way to do it better, easier or cheaper. Perhaps the work already done before it reaches you could be altered so as to make your work easier and at no additional cost to us. Look around and see where you can improve your work. This will help you as well as us. We want to help the men who help us.

You cannot afford to have our goods cost more than the same character of goods made elsewhere cost, because if our goods do not cost us any more than our competitors have to pay we can increase our business, which, in turn, means increased work and more men employed. The lower the cost of goods produced the greater the output, and the greater the production the greater the number of men employed. Cheapening the cost of production means that the goods can be sold at a lower price, and also means larger production, more work and more men employed.

All suggestions will be investigated, and, if approved, will be adopted as soon as possible. Suggestions that are not adopted by us will be destroyed. Prizes will be awarded in November next, and notice will then be posted as to the next award.

A manufacturing company in Ohio commenced manufacturing in a small way and with few men employed. They charged \$100 for each of their articles at first and sold only a few of



them. To-day they sell a very much better, higher grade article for \$15, and instead of having a small force they have 3427 employees and do an enormous business. This is only one example of many where a lower cost of production has increased the output. During the last six months they have had 2800 suggestions deposited in their boxes, of which 1100 were adopted.

The President of that company, when walking through the shops one day, saw a man boring a hole through a piece of casting. He asked the man if that was the proper way to drill that hole. The man said, "It is not exactly right, but it is the way I was told to do it." That man suggested a much better way and it was adopted. Another time the president saw a man cleaning castings. In talking with him he advised him to clean the castings better than they had been cleaned, and remarked that if he could suggest any better way of doing the work to do so in writing and drop the suggestions in the box.

This does not apply to new goods until after they have been made three months.

## Notes from Great Britain.

### Some Imminent Commercial Problems.

LONDON, April 18, 1902.—Although the Easter vacation is at an end and we are all back at business again, yet there is not much doing, and prices on the market are mainly nominal. In the quietude of these slack days it is not surprising that many commercial problems rise with vivid clearness upon our mental horizon. There is of course at this time, too, a disposition to face many commercial problems which we know to be imminent and of far-reaching consequence, but which we evade in the rush of daily detail and exigent routine. Among commercial questions which at the moment call for consideration may be mentioned the fall in the price of British consols, the Bagdad Railroad, the economic revival in Ireland, the question of transit, and many others.

The salient financial fact of the moment is that the British  $2\frac{1}{2}$  consols are down to 90. As the average price between 1895 and 1898 was over 109, the consequent fall in price of nearly 18 per cent. is likely to possess unusual significance. It is contended that the fall is due solely to the reduction in the rate of interest from  $2\frac{3}{4}$  to  $2\frac{1}{2}$  per cent. This view can hardly be maintained, since the reduction to  $2\frac{1}{2}$  per cent. in 1903 has been announced for 15 years. Certainly for the past five years no serious investor has considered consols as other than a  $2\frac{1}{2}$  per cent. security, with a  $\frac{1}{4}$  per cent. bonus up to 1903.

There can be but little doubt that the low price of consols is one of the *sequelæ* of the South African war. It indicates clearly enough that our surplus cash has been absorbed by unremunerative military operations, and that in consequence we are faced with a shrinkage in values. There are, of course, subsidiary reasons. Thus by the act of 1901 colonial stocks have been thrown open to trustees. This has led to a vast deal of trustee money being invested in our colonies which previously was confined to British consols. The British market has recently been flooded with high-class British securities to such an extent that the capacity for absorption by the British public has been overtaxed. Still, when all is said and done, the solid fact remains that in 1899 the British Government could raise money at  $2\frac{3}{4}$  per cent., whereas at the present moment were war to break out, it could only borrow money at a price considerably over 3 per cent. This surely indicates a change in our financial stability not without its significance.

### The Bagdad Railroad.

The projected Bagdad Railroad from Haidar Pasha, which is practically Scutari, across Asia Minor to Bagdad and so down to the Persian Gulf, finding outlet at Koweit, is a commercial and political event of the first importance. Politically Great Britain, France, Germany, Russia and Turkey are deeply involved; financially British and German capital is affected; commercially the great manufacturing and export nations are deeply concerned.

Before noticing these points, however, let me first briefly describe the extent and direction of the country proposed to be covered by this railroad. Assuming Koweit to be the final terminus, it will be observed that cargo boats in the Mediterranean to reach Koweit must pass through the Suez Canal, down the Red Sea, through the Gulf of Aden, thence northeast skirting the European coast, and so northwest up the Persian Gulf to Koweit.

Obviously, a railroad which skirts the north of Arabia is an immense saving of distance.

But the proposed railroad does not start from the Mediterranean, but from the Bosphorus. Scutari is practically Constantinople in Asia Minor. The railroad is already completed from Scutari to Angora. The programme is to continue the present railroad from Angora through the very heart of Asia Minor, touching such towns as Yuzgat, Sivas, Kharput, Diabekr, on to Mosul (which, by the way, is close to the ruins of Nineveh), so almost due south with a loop line to Bagdad, and finally through Basra to Koweit.

But in addition to this great railroad project to cross Asia Minor there is a British project of a railroad from Beyrout on the Mediterranean coast to Damascus, across (north of the Arabian Desert) to Bagdad, thence down to Basra and so to Koweit. It is evident, therefore, that Great Britain is politically affected first, because the Bagdad Railroad project is undoubtedly a German venture, and we are not without our fears that German traders will obtain preferential treatment. Second, Great Britain is politically affected because of the British project to which I have alluded; and, third, the diplomatic question comes up whether Koweit is to be declared neutral when the railroad reaches there, because at the moment it is officially recognized that Koweit is under British "influence."

The political aspects of this question as they affect Russia, France and other countries may be ignored, but if the Bagdad Railroad is to be completed, and if in addition the other railroad projects are, sooner or later, brought into being, then it follows that in the course of a decade or two Asia Minor is to be commercially developed beyond all knowing. In my opinion it is at this point that America becomes interested, for the simple reason that by means of her increasing mercantile marine she possesses at the moment and in the future will possess increased shipping facilities for reaching the Eastern coast of the Mediterranean. If, therefore, in conjunction with Great Britain, America can prevent differential rates giving a preference to German goods, there is no reason why Germany, Great Britain and America should not compete on equal terms for the trade of Asia Minor, which may prove to be considerable. Undoubtedly the proposed railroad runs through a potentially rich territory. America has one other point to consider. It may well be that when the railroad is completed we shall have a new and more direct means of contact with India. America's commercial connections with India are in their infancy. Who knows but that in the long run the Bagdad Railroad may prove America's key to India trade?

### Ireland's Commercial Revival.

American business men would do well to watch Irish events, for they are of unusual interest. The Government's proposal to buy out the Irish landlords and thus create an agricultural proprietary has been received by Irishmen of all shades of opinion with critical enthusiasm, if I may use an Irish bull. The desire to buy out landlordism both in the north and south of Ireland has been forcibly expressed for some years past. It is not a political, it is an economic question.

At a conference held in Dublin last week were gathered from all parts of Ireland gentlemen of all shades of political and religious opinion to take steps to establish an Institute of Commerce and Industry, and also to consider whether an International Exhibition should be held in Dublin. The chairman of the proceedings was W. J. Pirrie, head of the great shipbuilding firm of Harland & Wolff. The mere fact that this great captain of industry was in the chair shows that this is no hole and corner movement, but one which is backed by the best commercial intelligence of Ireland. It was agreed to found an Irish Commercial and Industrial Institute; that this institute should have branches in every part of Ireland, and that the full force of its influence should operate in the direction of greater efficiency in commerce and industry. It was further agreed to hold an International Exhibition at Dublin, of which more anon.

In this connection I may mention that W. J. Pirrie, in partnership with Lord Iveagh, has formulated a scheme for providing transport facilities in various parts of Ire-

land—a scheme which it is hoped will be the beginning of a network of transport organization which will cover the face of the country. W. J. Pirrie and Lord Iveagh jointly make themselves responsible for the initial outlay.

Lying as it does between England and America, the economic revival of Ireland should appeal as much to Americans as to Englishmen. It is certain that Irishmen are just as ready to buy from America as from this country—indeed, in many parts of Ireland the disposition would be to favor America. As to the permanence of this revival, it is as yet too early to speak. It must, of course, be recognized that generations of misfortune, misunderstanding and political upheaval have had a most depressing commercial effect. In addition, the climate of Ireland is enervating. Irishmen who seem to make no headway in their own country, as soon as they reach American shores at once show unusual intellectual and physical activity. The difference is not only to be accounted for by political and economic surroundings, but also by the varying climate. Without unduly overestimating the real meaning of this Irish *renaissance*, it is none the less sufficiently important for American exporters to watch closely, and if possible sympathetically.

#### Automobile Railroad Transit.

There are many other vital commercial problems which are well worth stating, but I must content myself with fleeting references to a question which may be summed up in the words "transit and power." That other and more modern motor power must be devised on the railroads to compete in the future with motor cars on the king's highway, is now recognized by prescient engineers. There must be automobilism on railroads to balance automobilism elsewhere.

The adoption of the automobile principle on railroads is about to have a fresh development on a third branch line jointly owned by the London & South Western and the London, Brighton & South Coast Railways, between Fratton and Havant, both in Hampshire. A motor car has been designed by D. Drummond, locomotive superintendent of the London & South Western Railway, which is the first of its kind brought out in this country to run on rails. The novelty of this vehicle consists in the fact that both engine and carriage are carried on the same pair of four-wheeled "bogies," the total length being 56 feet. As may be supposed, the engine is of exceedingly compact design, the boiler being of the vertical type, while the cylinders are inclined and the connecting rods drive direct on to pins on the front wheels. The boiler and cylinders are on the same frame. The engine is provided with a "cab" of the ordinary type, and at the other end of the vehicle there is a platform of the kind provided for motor-men on electric cars, from which the steam valves and brake handles may be worked by means of levers and connecting rods. It is thus possible to work the motor carriage from either end, which should prove a great convenience on short branch lines. As regards passengers, it accommodates 42. This number is as many as commonly travel on many branch lines in a whole train in the less busy hours of the day; moreover, as a vehicle of this type can make more journeys than a train at the same expense, it should be well able to cope with a good deal of the traffic of country districts where at present trains are running only half, or even a quarter, filled.

This newest railway automobile differs from those which the North Eastern Company are about to put on their line between East and West Hartlepool, in that it is propelled by a steam engine of the ordinary type. The North Eastern car, on the other hand, is driven electrically by a dynamo driven by a petrol engine. It is reported, however, that some difficulty has been experienced in obtaining a petrol engine capable of developing the amount of power necessary, which is far greater than the ordinary requirement of a motor car. These various experiments in the application of automobilism to railway work are being followed with the greatest interest by the authorities of all the companies, as it is hoped that considerable economy in the conduct of passenger traffic may result therefrom. It is understood that the Great Western is about to experiment in the same direction on a branch line in the neighborhood of Gloucester.

S. G. H.

#### Labor in Indiana.

INDIANAPOLIS, IND., April 25, 1903.—Indiana is the storm center of labor troubles. It is the home of the two largest labor organizations in the world—the Mine Workers and the Carpenters and Joiners—and of many others, great and small. It is also the home of David M. Parry, president of the National Manufacturers' Association, probably the most widely powerful as well as the largest of the employers' protective organizations. The entrance this year of the "nonunion union," the American Independent Mechanics, organized in that State, has added to the variety, if not the gayety of the conflicts.

Strikes began promptly with the advent of spring and to date have included, mainly in Indianapolis and the gas belt towns, stone masons, brick masons, cigar makers, tanners, carpenters, stationary engineers and firemen, hodcarriers, gasmen, machinists, boilermakers and blacksmiths, teamsters, plasterers, electrical workers, traction linemen, sheet metal workers, painters, decorators and paper hangers, lathers, miners, furniture workers, printers, clay workers, track ballasters, plumbers, concrete workers, laborers, pipemen, helpers of various kinds, and even prisoners in a county jail.

When the tanners joined the aggregation one of the army of Hoosier poets put it:

"Another demand

Is heard through the din;

The tanners now say

They must have more tin."

Most of the strikes were likewise for increased pay—and short hours. But there were other alleged causes. The hodcarriers, for example, demanded that sand used in mixing mortar should be screened on the premises by a union hodcarrier, instead of being screened before it is delivered. The engineer in a furniture factory in the gas belt struck without warning because a little overtime had not been paid for, and the factory was closed with its other 200 to 300 employees. This lasted for two or three days and was known as "the one-man strike." The employees of a plate glass company and a mirror company did not like their new foreman, walked out and caused the shutting down of the factories. There was a walk out for a similar reason in one of the railroad shops, except that the employees wanted the old foreman discharged. A printer was discharged and his fellow workmen quit. The ash wheelers in a tin plate plant one morning demanded an instantaneous increase in pay, and because it was not given on the spot they left and 800 other men were thrown out of employment thereby. Workmen in other factories struck because they wanted their unions recognized. The climax was reached when the Delaware County sheriff went into the jail corridors to order the prisoners to the stone pile and learned that they had formed a union, had certain demands to make and refused to go to work until they were acceded to. That strike was soon settled by the sheriff marching the strikers to single cells and putting them on a bread and water diet. Some of the other spring strikes in the Hoosier State were settled also, mostly by arbitration or concession, but in some cases by the employers telling the strikers to take their tools and go. A signal case was that of the superintendent of a large interurban company who, because his linemen taunted some telephone workers who had taken the place of strikers, discharged every one of them. Where the strikes are still unsettled employers are making efforts to fill the vacant places, firm in their decision not to yield to unjust demands. When the Independent American Mechanics are organized they have offered to take the places. In some of the towns most troubled employers of all kinds have bound themselves in an association for mutual protection. In addition to those already mentioned in *The Iron Age*, there is the Contractors' and Building Material Men's Association at Peru, Ind., which has been organized and incorporated (without capital stock) by Jacob Theobald and others, "to prevent all unjust and unreasonable discrimination against any of its members or employees by any person, combination or conspiracy."

Building operations have been paralyzed in Indian-



apolis, Muncie and other cities for a month, not only forcing delay on great numbers of buildings, but causing the postponing or abandoning altogether of other important building operations. The bricklayers demanded an increase of only 20 per cent. in wages—60 cents an hour for the bricklayer and 70 cents for the foreman. Threatened with lawsuits by architects and owners of buildings, contractors have had to yield.

The casket makers of the Central and Western States recently met in Indianapolis in annual convention and before adjournment organized the National Employers' Association of Casket Manufacturers, M. Wulpi of Omaha being secretary. The objects of the association were declared to be, 1, the adoption of a uniform basis for just and equitable dealings between members and employees, whereby the interests of both will be properly protected; 2, the investigation and adjustment by the proper officers of questions arising between members and employees, which may be referred to and come within the jurisdiction of the association, and, 3, the promotion of a clearer understanding by and between members on subjects pertaining to labor and other matters of common interest.

### J. T. Ryerson & Son's Increased Facilities.

The improvements being made by Joseph T. Ryerson & Son, Incorporated, Chicago, are rapidly nearing completion. These improvements consist of the remodeling of their old quarters at Milwaukee avenue, Lake and Clinton streets, and the erection of a large warehouse and storage yard at Sixteenth street and Campbell avenue. The remodeling of the Milwaukee avenue building will give the company much needed office room demanded by the rapid growth of their structural iron and machinery business. The remodeled building is five stories in height and of fire proof construction, the joists alone being of wood, but these are protected by asbestos covering beneath the floors, the joists resting upon steel girders.

The construction of the new warehouse on Sixteenth street relieves the Milwaukee avenue building, where heretofore a large portion of the plates, sheets, structural shapes and other material has been carried. Because of this relief the office portion of the building, which fronts upon Milwaukee avenue, has been extended 12 feet to the south. The building, which is five stories high, is heated by the overhead system of steam, lighted by electricity and equipped with electric elevators of the Otis type. The fifth story is being fitted for the engineering and drafting department, the light coming from the northeast. On the fourth floor are the private rooms of the company's officials, the directors' room, a club room and a consultation room for the salesmen. The third floor will be devoted to the Morrison furnace and traffic departments. The second floor is arranged to accommodate the credit, accounting and filing departments on the Milwaukee avenue front, while the L portion of the building accommodates the advertising and mill order departments. The sales department will have increased space and facilities on the first floor. Two two-story fire proof vaults are accessible from the first and second floors.

The warehouse portion of the building has been provided with additional facilities for the economical handling of material, including electric hoists and traveling hand cranes of the Pawling & Harnischfeger type. The plan of this building, as given in Fig. 1, shows a vacant space, 64 x 80 feet, which fronts on Lake street. This space will be built up in the near future to correspond with the structure surrounding it. The entire ground owned by the company at this location will then be utilized, completing the Lake street frontage of 149 feet.

The extent of the new warehouse and yard at Sixteenth street and Campbell avenue is shown in Fig. 2. The main warehouse, which is located on the north side of Sixteenth street, is entirely of steel construction, the beams being 15 inches and the girders 24 inches. The building is inclosed on all sides by corrugated steel. The main building is 160 x 266 feet and two stories in height. The shearing and plate shop forms an L to the main building and is 115 x 125 feet. The second floor of the

main building is constructed to support a load of 1000 pounds to the square foot. The ground floor has been laid with a bed of cinders 3 feet in depth, which has been packed under hydraulic pressure and covered with heavy yellow pine planks. The second floor, also of yellow pine, is 4 inches in thickness. The dynamo room is located at the north end of the main building. A depressed railroad track, a spur from the Pennsylvania system, runs the entire length of the eastern end of the building, entering at the north. The Chicago, Burlington & Quincy Railroad also has the right of way into the building. The warehouse is equipped with three 5-ton electric traveling cranes, provision having been made for these cranes to run east and west, as well as north and south, commanding all sections and both floors of the building. In addi-



Fig. 1.—The Milwaukee Avenue Warehouse.



Fig. 2.—The Campbell Avenue Warehouse and Storage Yard.

### INCREASED FACILITIES OF JOSEPH T. RYERSON & SON.

tion, chain hoists provide additional facilities for the economical handling of heavy material. The second floor is devoted principally to the storage of plates, sheets and boiler heads, and the first floor to bars, rounds and structural material. Special racks to withstand a heavy pressure have been constructed. The office and lavatory rooms are in the southwest corner of the building. The lavatory is equipped with shower bath and other modern conveniences, and the noon room for the men with individual lockers. With present facilities 24,000 tons of material are being handled per day, and with the electric magnets, which will be installed in the near future, nearly 35,000 tons can be moved. A day and a night shift are employed.

On the south side of Sixteenth street is a boiler and storage yard, 300 x 500 feet, provided with railroad track running the entire length of the yard from east to west,



and commanded by a 20-ton electric traveling crane with 100 feet span. In this yard and opposite the warehouse is the boiler yard shop, 60 x 132 feet, of brick and steel construction, provided with a deep cinder floor and equipped with a power cold saw, a combination punching and coping machine, shears and a bending machine upon concrete foundations.

The office and clerical force, including salesmen, numbers 160 men, and in the two warehouses, at Milwaukee avenue and Sixteenth street, employment is given to 105 men, including teamsters, making an aggregate of 265. The construction of the new warehouse and remodeling of the Milwaukee avenue building have been planned and executed under the direction of Ritter & Mott, Chicago.

### Scientific and Technical Notes.

The calorific power of coal can be obtained by the use of the following formula, with an error not greater than 1 per cent., according to M. Goutal, in the transactions of l'Académie des Sciences of Paris:  $P = 147.5 C + a V$ . The coefficients have been evaluated to give English units, and  $P$  is the calorific value sought, in British Thermal Units, per pound;  $C$  is the proportion of fixed carbon, in hundredths;  $V$  is the proportion in hundredths of volatile matter, and  $a$  is a factor which, for anthracite, has a value of 180. For coal having 90 per cent. fixed carbon, and 10 per cent. volatile matter, this works out at 15,075 B. T. U.

The vibrations of a steam engine resting on a concrete foundation set on a thick bed of clay, with chalk underlying, were suppressed in the following manner in Ayr, Scotland: Shafts 4 feet in diameter were sunk into the subsoil for a distance of 30 or 40 feet. At the bottom of the shafts enlargements were made and concrete foundations put in. Cast iron pipes, 30 inches in diameter, in 12-foot lengths were reared on these foundations to the under side of the engine bed. The pipes were then filled solid inside with Portland cement concrete, and sand packed around the outside of the pipes, filling up the shafts. The whole engine bed was supported in this way, isolated from the surface soil.

An English lecturer recently stated the average life of an English express locomotive to be 25 years, of a local passenger engine 25 years, of a freight locomotive 26 years and of a switching engine 27 years. The total mileage of an express passenger engine was placed at from 700,000 to 1,000,000 miles; and for each of the other classes of engine a mileage of 500,000 to 800,000 was given. In the United States, the average life of an express locomotive was given as 18 years, of a local passenger engine 19 years, of a freight engine 16 years and of a switch engine 22 years. Whereas the mileage of an English express locomotive was only at the outside 1,000,000 miles in 25 years, or 40,000 per year, in the United States it is often as high as 2,000,000 miles, or 110,000 miles per year.

One of the latest of the asbestos discoveries has received the name of "Salamanderite." Besides being thoroughly fire proof, it can be made to duplicate any decorative effect obtainable by the finest cabinet work in the costliest woods, or by tiling, and at a small percentage of the cost of the genuine article. It may be finished in exact *fac-simile* of quartered oak, mahogany, maple or any fancy cabinet woods, either plain or in the finest marquetry or bas-relief effects, indistinguishable from the most costly work, so says a recent prospectus. Its value for churches, theaters, steamships, residences and other structures is obvious.

When an engine has been run for a considerable period with no other lubrication than the water of condensation in the cylinder, the interior surface becomes highly polished, and the appearance is known by the term "water polish." It seems to be a thin, hard skin, formed

on all the sliding surfaces, which makes them very smooth. However, this is soon lost if the engine is allowed to stand idle for a short time, as the polished surface will rust very rapidly. In the case of some ammonia compressors, no lubricants have been used, without observing any ill effects. The ammonia gas seems to affect the already smooth surfaces, and gives them a high degree of polish after the machine has been in service a short time, the glaze or polish being a permanent one. But in any case where oilless lubrication is practiced it would be advisable to inquire into the effect upon the coal pile before coming to any definite conclusions regarding the economy of using no oil.

Water purification is occupying a good deal of attention just now at the hands of electro chemical inventors. A recent patent deals with a system for purifying water and other liquids, in which a set of pipes arranged to admit the liquid and a certain amount of air are connected into a circuit from an electrical source, and the walls of the outlet pipe are associated with electrode surfaces. The disintegrating effect of air upon organic substances is well understood, and it is also well known that running water, on account of its constant exposure to the air, is free from impurities. It is evident, therefore, that the water flowing past the suction air tubes will become impregnated with oxygen, and if the water has become tainted or impure by reason of the presence of animalculæ or organic matter it will to a certain degree be purified before reaching the electrodes. As soon as the water enters that part of the pipe between the electrodes the circuit will be closed, and the stream subjected to a current of sufficiently high potential to destroy all animal or vegetable life that may have escaped the previous treatment by aeration, so that when the water is discharged from the apparatus it will be purified, safe and palatable for drinking purposes.

Some idea of the strength and stiffness embodied in modern lathes may be gained from the fact that a recent lathe, using four tools, has reduced a steel shaft from 36 to 28 inches in diameter with a feed of  $\frac{1}{4}$  inch. That is to say, the depth of the cut was 4 inches, this depth being divided among the four tools. In such heavy cuts as this a question arises as to the relative economy of forging more closely, or of reducing by turning a shaft forged only approximately to size; and it has been found that when the cost of the hammer used in forging such large shafts is considered, together with the furnace and fuel, and when it is considered that from 10 to 20 men are required to operate such a hammer, there is greater economy in forging the shaft approximately to shape and diameter, and then reducing it in a lathe made especially for the purpose, as this lathe was. Of course, where the only lathes available are weak, and where the process of turning must therefore be necessarily slow, then it pays better to forge more closely; but with lathes which will take such a cut as the one named it is much cheaper to reduce the shaft by turning, and as the new high speed steels come to be used for this work, and lathes are constructed to be driven at higher speeds, the advantage of the lathe over the hammer will be still greater.

An electric interurban railway is to be built from Rochester, through Canandaigua to Geneva, a distance of 40 miles, and is to be known as the Rochester & Eastern Rapid Railway. The electrical equipment includes two 650-kw. three-phase alternators, at 390 volts and 3000 alternations, run at 150 revolutions per minute by direct connected cross compound engines; seven 300-kw. three-phase rotary converters; four 500-kw. and nine 200-kw. oil cooled transformers, wound for transformation from 390 to 16,500 volts, and two  $37\frac{1}{2}$ -kw. excitors. This road, which is to be ready for operation in July, is the second of this length running east from Rochester. The other is the Rochester & Sodus Point Railway, which has been in operation nearly three years, and in which the transmission line, 27 miles in length, carries current at 10,000 volts pressure. The whole line has a length of 42 miles.

# The Iron Age

New York, Thursday, April 30, 1903.

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JOHN S. KING,	-	-	-	-	-	-	-	BUSINESS MANAGER.

## The West and the Supply of Money.

The opinion of one of the great railroad magnates of the country, after a trip across the continent, that the West will be able to finance the crop moving next fall, would carry more conviction were it not that indications a year ago that were even more favorable were belied in the fall. The bank statistics a year ago showed that the Western banks had greatly strengthened themselves in the previous year or two. The ample funds that good prices for large crops had put in the hands of farmers appeared in the reports of the banks. Eastern bankers intimately connected with Western enterprises expressed confidence that the West would make little or no demands upon the East for money in the fall. Western bankers were ostentatious in their protestations of independence of the East, and late in the summer or early in the fall, when Secretary Shaw was receiving urgent appeals from the East to do something to relieve the monetary stringency, he replied by quoting letters from Western bankers, who said they had money enough; there was no stringency with them and no prospect of any. In a sense they were justified in saying this; they had money enough, but a good deal of it was not at home; they had loaned it in New York and could only get it by creating a stringency there. High financial authority estimates that Western and Southern banks had \$200,000,000 on deposit in New York banks last summer—two New York banks loaned \$90,000,000 of this money—and a good deal of out of town money was loaned directly. As the season advanced every cent of this money was withdrawn from New York and a good deal in addition was borrowed. In spite of all this the reserves in all the central reserve cities and in 22 of the 30 other reserve cities were below the legal limit on September 15, before the stringency was at its greatest; the reserves in Chicago were below 22 per cent., and in three Western cities they were below 20. Yet the statements of the increased strength of the Western banks were entirely correct; the predictions were belied by the fact that, while the resources of the West were greater than ever before, a good deal of these resources were, as usual, loaned in the East during the summer, and the Western need of money in the fall had grown even more than the Western supply. For one thing, the corn crop last year was the largest ever gathered.

Now as to the present conditions, the reports to the Comptroller of the Currency indicate that reserves in national banks in the West are often less in percentage, and sometimes less in actual amount, than they were a year ago. There is a greater employment of money, relatively, or absolutely, or both. Doubtless the resources of Western banks will be greater next fall than last fall, but it is doubtful if they will have more ready money to meet an emergency with; they will hold more local investments and they will have more money on deposit in New York, and they will get together funds for moving the crops by the too familiar process of calling loans, or compelling New York banks to do so. This is not a prediction of a monetary stringency next fall, but a sugges-

tion that there has been no substantial change in the situation since last year, when the autumnal requirements compelled the Western banks to recall all their funds from the East and borrow money besides. As to Western money in the East, there are already reports from the former section that the banks and trust companies of the latter are soliciting deposits and offering an increase of interest for them. If this is general a larger share than usual of Western money will be in use in New York at the time the West will have pressing need for every cent of its own money, and possibly for loans.

This is the situation which the refusal of Congress to enact remedial legislation has created. In August we may again expect appeals to the Secretary of the Treasury to relieve the money market, and no man will know at what precise point of pressure the Secretary will yield, and there will be, for the moment at least, a sudden fall in money rates and a sudden advance in prices on the Stock Exchange. The Secretary's resumption of refunding has added something to the circulation, and will add something more. It is not at all certain that the amount so added would avert a tight money market, even if this were the crop moving season. But the conspicuous fact is that the severe point of the autumnal pinch is six months away; banks are not taking out circulation now to keep in idleness till then; the circulation now taken out is taken out for present use; it can be got hold of for crop purposes five or six months hence only by taking it out of some other use, and that is the very thing that disarranges business and forces up the rates for money.

It is to be hoped that next winter Congress will provide legislation under which the currency may expand adequately and automatically when the fall requirements come on. In the meanwhile there is nothing for the business community to do but to take due notice that money is already exceptionally well employed, that there is a land speculation in the West that it is absorbing a good deal of money, that the wheat crop already promises to be the biggest and to need more money for handling it than any previous crop, and that such indications of other crops as there are point to big yields all along, and proportionate need of funds in the fall.

## To Provide Funds for Chicago.

In commenting upon the many difficulties against which the city of Chicago is contending, the *Economist* calls attention to the fact that the new charter bill which has passed the legislature in modified form will confer no benefit upon the city for several years at the best, and that there are works to be performed which require great effort and large amounts of money; hence the sale of the city water works property is advocated. This property, it is claimed, could be sold for from \$50,000,000 to \$75,000,000, under contract, which would give the people a better service—or, we might say, less bad service—than at present, and would yield the city through the division of the profits an income which in a few years would be as great as is now derived from the works. The money from such a sale would become quickly available and the city still have an income from the property.

It is useless, however, to make suggestions of this character at the present time—at least while the populace ride the hobby of municipal ownership. Corporate mismanagement may be responsible for the present temper of the people, but in going to the extreme of municipal ownership under municipal administrations like those of the past six years would probably be like jumping from the frying pan into the fire. The *Economist's* suggestion is



good and founded upon business principles, but the element in favor of a business administration for the city of Chicago was not strong enough to carry the popular vote. Hence all business propositions for the next two years seem likely to meet with scant consideration.

### German Experience in Industrial Assurance.

The desire of the German Emperor, and no doubt of his people, to render impossible in Germany the squalid poverty which exists in many other countries, is doubtless inspired by motives of the highest humanity. Concerning the results to be expected from the means to that end which most commend themselves to sentimental philanthropists, there is room for intelligent difference of opinion. One of the means which has been most discussed and which is believed to promise most in benefits to those whose welfare is always a matter of public interest is what is known as industrial insurance.

From the German point of view, assurance is a system of benefits of which the person benefited must avail himself whether he cares for it or is indifferent to it. Industrial assurance is of three kinds, and all are obligatory. The divisions of this system of practical benevolence may be briefly described as follows:

I. Assurance Conferring Sick Benefits.—The premiums by which this system of insurance is carried are collected in the proportions of two-thirds from the wage earners and one-third from the employers. The allowance in case of incapacitation by sickness is made for 13 consecutive weeks, or any part of that period which covers its duration, and if necessary the sick man is sent to a sanatorium without expense to himself. A representative institution of this character is that at Beelitz, visited by the International Conference on Tuberculosis lately held in Berlin. It contains 600 beds, all reserved for persons suffering from infectious diseases, 300 of which are for consumptives. The appointments are calculated to surprise the visitor and set him wondering whether all of the money expended in its construction and equipment was wisely employed. The baths are of every kind recognized as having value, and would seem to have been provided in excess of the needs of the patients. Disinfection is provided for in accordance with the most advanced ideas of asepsis and antiseptis, and this is provided for not merely in the wards but in special buildings erected for the purpose in the spacious grounds of the institution. The accommodations cover facilities for the administrative staffs, the kitchens, laundries, chemical and bacteriological laboratories, photographing rooms, X-ray chambers, blue light solariums, outdoor shelters for those for whom the open air treatment is prescribed, libraries, reading rooms, amusement parlors—in short, everything necessary or desirable to make life as pleasant as possible for the inmates and approved by the most advanced specialists in sanatoria equipment. The cost, which has been borne from the treasuries of the Industrial Assurance societies, is about \$5660 per bed. This is carrying a good thing to the extreme of reckless extravagance. Sanatoria quite as well adapted to the ends in view, with every convenience, every necessary appointment and practically every luxury which would contribute to the comfort or happiness of the patients, can be built for a total cost of \$1000 to \$1500 per bed. Such buildings, especially when devoted to the accommodation of patients suffering from infectious diseases, become saturated with germs in a longer or shorter period, and should be pulled down and rebuilt every ten or fifteen years at least. In that time, and perhaps much sooner, the Beelitz institution will be out of date, and presumably in such condition that the chances of recovery

for a patient would be much better in a hollow tree in the Black Forest than in one of its very costly beds. The astounding lavishness of the expenditure upon this institution may perhaps be explained by the fact that in 1900 the reserves of the different unions applicable to the payment of sick benefits amounted to 156,000,000 marks.

II. Assurance Against Accident.—The premiums for this class of benefits are paid by the employers. It is really a form of life insurance. If a workman is hurt—not fatally—his sick benefits are paid for 13 weeks from the fund described above, and not until after that period does payment from the accident fund begin. If a workman is killed outright, or dies from accidental injuries, his family is entitled to a yearly income from the accident fund, of which the reserve in 1900 was about 141,000,000 marks.

III. Assurance of the Aged and Invalid.—The premium fund for this form of insurance is paid one-half by the wage earners and one-half by the employers of labor. It applies chiefly to persons who are incapacitated for work by prolonged illness or incurable infirmity, and takes the shape of a permanent pension; also to those who having remained at work up to the age of 70, and being then incapacitated, are entitled to a pension for the remainder of their lives. To such the pension is increased by 50 marks per year by the German Government. It has been decided to increase the reserve for this form of insurance to 2,300,000,000 marks, and to maintain it at that figure whatever the drafts upon it. It is now in the neighborhood of 900,000,000 marks. The reserves of the several assurance societies of Germany are now about \$300,000,000.

How this whole principle of direct taxation for the benefit of a class is regarded depends very much upon the point of view of one who considers it. There is a reason for it in Germany which cannot very well be assumed to exist here. Whether that reason is one which squares with sound economic principles is perhaps a matter of opinion. It may be assumed that no governmental system of compulsory benefits will make up for any lack on the part of the people benefited of the homely virtues of thrift and providence, and if these exist they do not need to be supplemented more liberally than private philanthropy is doing in every civilized country of the world. In Germany relatively low wages and relatively high taxation, which raises the standard of living expenses arbitrarily, and more especially the unsettlement of habits due to the claim of the Government upon the services of every man with the physical qualifications for success in the mechanical trades during the best years of his life, impose artificial conditions which do not exist under other governmental systems. The German experiment is interesting, like some of those in operation in Australia, but it does not invite imitation under the conditions now existing anywhere in the United States.

### Our Unprecedented Importations of Merchandise

The Statistical Bureau of the Treasury Department announces that the imports of merchandise into the United States during 12 months ended March 31, 1903, were valued at \$1,001,596,683. This is the first time in the history of the foreign commerce of the country that imports in a 12-months' period have exceeded \$1,000,000,000. Prior to 1870 the value of imports was less than half a billion dollars in a single year, and it was not until 1890 that the yearly imports aggregated three-quarters of a billion dollars in value. The gain in imports has been especially rapid during the past five years, and has been due mainly to the importation of manu-



facturers' materials, statistics showing a marked increase in the proportion which manufacturers' materials have held to the total importations. The details for the month of March, however, are not yet available, but in the eight months of the fiscal year ended with February, 1903, manufacturers' materials were valued at \$320,000,000, against \$270,000,000 in the corresponding months of the preceding year, an increase of \$50,000,000, or nearly 20 per cent., but in the month of February alone manufacturers' materials formed more than one-half of the total imports. This is also true of February of the preceding year.

During the 12 months ended with March, 1903, the total exports of the United States were \$1,414,786,954. There was thus an excess of exports over imports of more than \$400,000,000, as compared with an excess of exports over imports for the corresponding period of 12 months of over \$500,000,000. As it is now generally understood that the lessening of our balance of trade, so-called, is really the favorable sign, indicating a stronger position in our foreign commerce, these figures are encouraging, but comparisons of this sort made at this time of the year are not specially significant.

Relatively large imports are not looked upon now as of an "unfavorable" character, it being understood that the excess of exports over imports of commodities does not necessarily draw money from other countries, nor is it by the accumulation of money alone that national wealth is increased. Money is only the means of effecting the interchange of those things that constitute wealth, and the entire volume of money in a country does not hold a direct relationship to the value of the property or to the amount of a country's trade. The point to bear in mind is that the importation of gold into a country bears no proportion to the excess of exports over imports in merchandise.

### The United States Steel Syndicate.

Final distribution has been made of profits to the members of the syndicate organized a little over two years since to underwrite the securities of the United States Steel Corporation. The circular announcing this fact was sent out April 25. But according to this circular, instead of distributing the balance of the syndicate profits, cash or stock, in that form without any conditions attached, the syndicate managers have practically compelled the members of the original syndicate to become participants in a later syndicate, known as the Bond Conversion Syndicate, which guarantees to provide for the deposit of \$80,000,000 of the preferred stock of the United States Steel Corporation and \$20,000,000 cash in exchange for \$100,000,000 for the new second mortgage bonds, which the company are now offering to their shareholders. The circular, which is signed by J. P. Morgan & Co., is as follows:

We take pleasure in informing you that we are now prepared to make the final distribution to participants in the above mentioned Syndicate on the nominal amount of their participations, being the balance of the Syndicate's profits.

Your subscription was for ..... and your share in such distribution will be:

Cash .....  
Certificate of participation in United States Steel Corporation Preferred Stock Retirement Syndicate (80 per cent. paid up in preferred stock, remaining 20 per cent. payable in cash when called) .....

Which we will pay, or deliver you on presentation and surrender to us of the receipt which you hold, properly indorsed.

This conversion of the old syndicate into a new one for other purposes has caused some sharp criticism, but it appears that the original syndicate underwriting agreement gave the syndicate managers power to use the syndicate funds in almost any manner conceivable. They apparently had the widest latitude as to the purpose and sale of securities.

Figuring on the basis of an original subscription of

\$1,000,000, this latest distribution amounts to \$30,060 in cash and \$25,000 in bonds of the Steel Corporation, of which 80 per cent., or \$20,000, has been paid in preferred stock, leaving each syndicate member who originally subscribed for \$1,000,000 in the old syndicate liable for \$5000 of the new bonds.

The original steel syndicate was for \$200,000,000. Of this amount only \$25,000,000, or 12½ per cent., was ever called. This original subscription was soon thereafter repaid to the subscribers, and this payment was at intervals followed up by four dividend payments of 5 per cent., or \$10,000,000 each. In March, 1903, the syndicate managers, seeing that 40,000 shares of the syndicate's preferred stock were still undisposed of, subscribed for the syndicate to a \$5,000,000 interest in the Stock Conversion Syndicate. Under this subscription the 40,000 shares were turned in at par, making \$4,000,000 of the subscription paid up, while the remaining \$1,000,000 was left as a contingent liability for the syndicate members to assume. The members expect that they will actually have to assume this liability, as subscriptions for the bonds are required to be at par, while in the market the price is around 84.

The results of the syndicate's operations have been summarized as follows:

Nominal liability of syndicate.....	\$200,000,000
Cash actually paid in.....	25,000,000
Cash dividends, 23 per cent., or.....	\$46,000,000
Paid up participation in bond conversion syndicate, 2 per cent., or.....	4,000,000
Total .....	\$50,000,000
Add one-fifth interest in total profits, this being commission of syndicate managers.....	12,500,000
Grand total, all profits.....	\$62,500,000

The profit is equivalent to about 31¼ per cent. on the nominal liability of the syndicate and to 250 per cent. on the amount of cash actually paid in. It was therefore one of the most profitable syndicates ever organized.

### The American Can Company.

The annual meeting of the American Can Company was held in Jersey City, N. J., on Tuesday of this week. It was a stormy session. Several of the minority stockholders present denounced the management, and protested against the election of the directors nominated. One stockholder got up and said that in his belief the company was not properly managed. He did not see why dividends should not be paid on the preferred as well as on the common stock, and expressed surprise over the vast amount of competition the company had allowed to develop. He suggested that an expert be allowed to go over the books and examine into the company's affairs.

President Assmann informed the stockholders that the inventories had been written down to the proper basis and that it had been necessary to expend a large sum of money in rehabilitating many of the plants. The task, he said, had been a hard one, but that rock bottom had been struck and the company were in a fair position now to make good profits.

At a subsequent meeting of the directors for the election of officers the following changes were made: The order of first and second vice-presidents was discontinued and A. H. Atfel and F. Rudolph were elected vice-presidents. The appointment of L. Muench as a vice-president by the board last year was confirmed. T. G. Granwell was re-elected a vice-president. This makes the number of vice-presidents four instead of two, as was the case last year.

A new office, that of chairman, was created and D. G. Reid was elected to fill it. No provision was made for the chairmanship of the Executive Committee, which was formerly held by the late H. F. Alken. No provision was made either for the offices of treasurer and auditor which are to be held by F. S. Wheeler. R. H. Ismon was elected secretary and assistant treasurer to succeed A. H. Landon. J. H. Sturgis was elected an assistant auditor. The other retiring officers were re-elected.

Ex-Judge Moore said that since the incorporation of the company they had been undergoing a thorough reorganization and were now on a business basis. He added that within the next six months it would be proper to begin payments of dividends on the preferred stock.

The financial report is not up to expectations. The net profits for the year ended March 31 were \$886,711. To pay dividends at the rate of 7 per cent. a year on over \$40,000,000 outstanding preferred stock would require \$2,800,000. This is more than the total surplus accumulated by the company within the last two years. The total surplus for the year ended March 31 last is equivalent to less than 2¼ per cent. on the outstanding preferred stock.

President P. A. Assmann in his report says: "The inventory has been taken on the basis of cost. The company do not owe any money except for current accounts, discount all their bills and are in good financial condition. When the company were formed, and since, there were taken over 123 plants. To-day they are operating in 36 can factories in three machine shops. In addition they have erected two detinning plants, one of which is now in successful operation; the other will commence within a few days. Preparations have been made to close five more can factories, and one, or perhaps two, machine shops, and they will then operate in 31 can factories, one or two machine shops and two detinning plants. The company delivered, as they did in the previous year, about \$1,500,000 worth of packers' cans in December, January, February and March, and had the company received the same average price for their products as they did during the previous fiscal year, the sales would have been about \$27,000,000, against \$24,000,000 for the same period. The trade conditions for the near future are encouraging. The company have a satisfactory quantity of business on their books at remunerative prices."

The American Can Company report, for the year ending March 31 last, net sales of \$22,076,394. The value of the product was \$22,455,837; deduct material consumed, \$14,492,630; direct and general cost of production, exclusive of materials, but including all labor, salaries and expenses of dismantling, centralizing and remodeling factories, \$5,655,321; other expenses, \$1,365,135; total, \$21,513,086; balance factory profit, \$942,751; and other profits, \$238,598; total profits, \$1,181,349; deduct miscellaneous expenses, \$294,638; net profits, \$886,711.

The general balance sheet of March 31 compares as follows with the preceding annual statement:

Assets—	1903.	Increase.
Plant, real estate, &c.....	\$75,298,083	\$41,704
Improvements .....	1,808,339	1,441,470
Other investment items.....	1,009,439	.....
Cash .....	1,639,291	563,502
Bills and accounts receivable.....	1,448,214	1,190
Merchandise inventory.....	5,121,901	*719,984
Totals .....	\$86,365,267	\$1,327,882
Liabilities—		
Preferred stock.....	\$41,233,300	.....
Common stock.....	41,233,300	.....
Mortgages assumed.....	113,000	*\$6,000
Accounts payable.....	1,123,393	447,172
Surplus .....	2,662,275	886,711
Totals .....	\$86,365,267	\$1,327,882

\*Decrease.

**The Amalgamated Association.**—The report of the Wage Committee of the Amalgamated Association was read in executive session at Columbus, Ohio, on Monday, April 27. While nothing has been made public in regard to contents of the report, it is understood that but few changes have been made in the present wage scales, but that such changes are in the nature of a general advance in wages. The minimum was fixed on the puddling scale on a basis of \$5 per ton. It is also said that the report recommended that \$1 per ton extra shall be paid for dephosphorized iron, also for Bessemer pig when worked alone. The report also recommended that no double puddling furnace shall be worked with less than four men. It was decided to hold the next convention of the Amalgamated Association in St. Louis.

There is a strike of all the machinists of Quincy, Ill., involving about 80 men. It was caused by the discharge for good reasons of a man in the employ of the Quincy Engine Works. The company agreed to arbitration, but according to the latest advices the union had not accepted the conditions.

## OBITUARY.

DAVID BELL.

The death of David Bell, one of Buffalo's pioneer ship and engine builders, occurred at his residence in that city on the 20th inst. at the advanced age of 85 years. Mr. Bell was born in Dumfries, Scotland, in 1817, and in 1842 came to this country and located in Buffalo, where he became a ship builder, and also conducted a machine shop and locomotive works that 40 years ago was at the head of its class. In 1866 the Bell Locomotive Works built four locomotives that were monsters for those days, each locomotive weighing 30 tons. Two were bought by the Lake Shore and the others by the Erie, \$25,000 being paid for each. In these days of 120-ton locomotives they would be considered pigmies, but at that time were commented on by the leading papers throughout the country as being giants. Mr. Bell was also a pioneer in the building of large lake craft. He was a public spirited citizen, and was sometimes called the Peter Cooper of Buffalo, being the principal organizer of the Mechanics' Institute, and taking great interest in the progress of young men.

CARLOS FRENCH, a well-known Connecticut manufacturer and inventor of a steel car spring in general use, died suddenly from heart disease on April 15 at his home in Seymour, Conn., aged 67 years. Mr. French was president of the Fowler Nail Company, vice-president of the Matthews Mfg. Company and a director of the New York, New Haven & Hartford Railroad Company, besides being interested in a number of other manufacturing concerns. He represented the Second Connecticut District in the Fiftieth Congress, was Democratic national committeeman and served eight years in the Connecticut Assembly.

CHARLES B. BEALL, president of Beall Bros. and Beall Shovel Company, Alton, Ill., died on Saturday, 11th inst.

THEODORE DEHON RAND died April 24 at his home in Radnor, Pa., aged 67 years. Mr. Rand, who was a lawyer by profession, was versed in mineralogy, geology and botany, and had published a number of scientific papers and lectured before scientific bodies. He was a member of the Franklin Institute, the Academy of Natural Sciences and American Philosophical Society. He was treasurer of the American Institute of Mining Engineers.

GEORGE WILLIS BEMENT, head of the well-known firm of E. Bement's Sons, manufacturers of agricultural implements and stoves at Lansing, Mich., died on Sunday evening, April 19, from a stroke of paralysis. He was born in Fostoria, Ohio, November 9, 1850, and learned the trade of a molder in his father's foundry at that place, subsequently working at his trade in Tiffin, Toledo and other places. In 1870 he went to Lansing to join his father and brother in the foundry business they had established in that city, and for the past 33 years had been a citizen of Lansing, building up the business of E. Bement's Sons into the position of eminence it now occupies. He was a useful and prominent citizen and was actively interested in all that furthered the welfare of the community. He served in the Common Council of the city and as a member of the Board of Education, and filled a number of offices of honor and responsibility.

JOHN MCGUIRE, general superintendent and business manager of the Variety Iron Works, of Cleveland, Ohio, died recently at Florence, Col., where he had gone for relief from lung trouble, with which he had suffered for some time. Mr. McGuire was 46 years of age and a native of Buffalo, N. Y. He had been connected with the Variety Iron Works for 27 years, having served as general superintendent for the past 15 years.

RICHARD PERCY HECKSCHER, son of the late Richard Heckscher, died at Lakewood, N. J., on Wednesday, April 22, 1903, in his forty-third year. During his early business career he was identified with his father in anthracite coal operations, and later his activity and energy were prominent factors in the development of the Swede blast furnaces at Swedeland, Pa., with which he was connected as a partner, and later as general manager and vice-president of Richard Heckscher & Sons Company.

FRED. G. MASON, general manager of the Novelty Iron Works, Sterling, Ill., was struck by a locomotive when crossing the railroad tracks at Sterling on April 23. He



lived but a short time after the accident. Mr. Mason was a native of Sterling, 49 years old.

IRVING M. SCOTT, who for many years was vice-president and general manager of the Union Iron Works, died at his home in San Francisco, Cal., on April 28. Mr. Scott was the builder of the battle ship "Oregon" and other war ships for the United States Navy, and was widely known as an authority on the construction of war vessels, his advice being sought at various times by different European governments. He was prominent in California in manufacturing, in politics and in educational work. He was born of Quaker parentage at Hebron Mills, Baltimore County, Md., in 1837, and was educated at the Milton (Ind.) Academy and the Baltimore Mechanics' Institute. After being employed in factories in Baltimore and other cities and becoming an expert draftsman and engineer, he went to California. He designed the machinery for working the famous Comstock mines and invented many machines. He was president for several terms of the Mechanics' Institute and of the Art Association of San Francisco, Regent of the University of California and a trustee of the Leland Stanford, Jr., University.

JAMES WOODRUFF, head of the firm of J. Woodruff & Sons, Salem, Ohio, manufacturers of stoves and foundrymen, died on April 20 at his home in Salem, aged 84 years.

### Trade Publications.

#### Multiple Drills and Horizontal Boring Machines.—

Two very elaborate catalogues dealing with these machines have been received from the Niles-Bement-Pond Company of New York. The paper, engravings and press work are of the highest grade, the result being a specimen of book work only occasionally produced by manufacturers. The multiple drills are of two general types: 1, In which the spindles are adjustable to any position in a given line; and 2, adjustable multispindle drills, in which the spindles may be arranged in a group of any shape or size within the capacity of the machine. Their whole series of adjustable multispindle drills of the Pratt & Whitney pattern have been redesigned. Their Nos. 11 to 14 are intended for drilling simultaneously a number of holes in valve flanges, electric car motor frames, automobile hubs, and work of a similar character. In setting the spindles the work jig is bolted to the table, the drills inserted in the jig holes, and the arms adjusted to bring the spindles into proper alignment and then clamped. The change from one size or shape to another can be made very quickly. On their standard multiple drilling machines, Niles design, each drill head has an independent adjustment by rack and pinion on the cross rail. The drill spindles have power feed with three changes; are counterweighted and have quick return. They may be fed also by hand simultaneously. Each spindle has independent drive and feed clutches, so that any of the drills may be moved up or down by hand while the others are feeding. Their universal horizontal boring, drilling and milling machine, Bement design, No. 881 B, carries a spindle 8 inches in diameter, has 15 changes of speed, six changes of boring and drilling feeds and 48-inch traverse. It has a swivel motion on the saddle through an angle of 45 degrees above or below the horizontal position. This swivel motion is effected through a worm wheel and circular steel rack. The counterweighted saddle has a vertical adjustment of 10 feet by power. The column, which is supported on a massive bed, rotates through an arc of 90 degrees, and has a power traverse of 10 feet. Eight independent milling feeds are provided for both the column and saddle.

**Second Hand Machine Tools.**—A new list has just been issued by the Garvin Machine Company, Spring and Varick streets, New York. It includes many types and sizes of machine tools which the company have in stock at their second hand department. The list is attractively issued in pamphlet form, and illustrations of several types of the tools are given.

**Crane's List.**—A. M. Crane & Co., Incorporated, of Chicago, Pittsburgh and New York, have issued their *List* for April, comprising 64 pages. This publication gives standard price-lists of planished steel shafting, cold finished steel squares, flats, hexagons, &c., standard lists of bolts, nuts, taps, reamers, &c., sheet steel extras, the bar iron and standard steel classification, tables of weights of rolled iron and steel, and illustrations of numerous specialties for which the firm are sales agents. Attention is called to the opening of offices in the Frick Building, Pittsburgh, Pa., in order to be in close touch with leading sources of supply. They announce that they are prepared to handle everything in iron and steel.

**Standard Lists and Diagrams of Shapes.**—The Jones & Laughlin Steel Company, Lake and Canal streets, Chi-

cago, Ill., have issued a pocket volume comprising 170 pages, which contains a great deal of exceedingly valuable matter for general consumers of iron and steel as well as engineers. Included among the contents are standard lists of iron and steel covering the standard classification of soft steel, soft steel hoops, tank and other forms of rolled steel, shafting, cold rolled steel of all forms, tool steel, Swedish iron, nails, carriage and machine bolts, rivets, nuts, &c., tables of weights of rolled steel of different shapes, sizes of structural shapes rolled by the company, safe loads of channels, beams, tees, angles and zee bars, safe loads of columns of different patterns and diagrams of all shapes manufactured by the company, giving full dimensions.

We have received a very neat and artistic catalogue from the W. P. Davis Machine Company of Rochester, N. Y., builders of lathes, drills, key seaters, cutting off machines and special machinery. It is of standard size, 6 x 9 inches, containing about 60 nicely arranged and well printed pages and a handsomely embossed cover. A noticeable feature of the work is the adherence to wood engravings throughout the book. The neat and clear cut effect of these engravings in connection with the excellent typography furnishes a pleasing contrast with some of the half-tone work which is used nowadays. The descriptions given opposite the engravings are short, concise, unembellished information about the respective machines. One page of the catalogue is used to very good advantage in the reproduction of a large section of the map of the United States and Canada. This shows the various railway routes leading to Rochester from all sections of this country and Canada. Supplementary to this a table is printed showing the time required in traveling from the principal cities to Rochester.

The Whitehead Machinery Company of Davenport, Iowa, who purchase and sell steam power equipment, have issued Catalogue No. 41 covering specifications of Corliss, automatic and throttling engines; water tube and tubular boilers; steam and power pumps; belting and fly wheels, condensers, smoke stacks, and feed water heaters. The goods offered for sale are guaranteed to be in accordance with representations, and no claim is made that inspection releases the company from their guarantee. Detailed specifications of any item listed can be obtained through correspondence. Two supplementary cards accompany the catalogue, giving particulars in regard to compound engines and dynamos which are offered to the trade. Correspondence is solicited.

Under the title of "Cogs That Fit," the Engineering Agency, Monadnock Block, Chicago, Ill., issue an attractive little document referring to the character of their business, which is that of furnishing competent technical men "who can do things for the men who want things done." They say, "A technical man is like a cog. He must fit in his place if he wishes success."

#### The Continuous Rail Joint Company's Albany Plant.

The Continuous Rail Joint Company of America, Newark, N. J., have concluded the purchase of about 20 acres of land at Troy, N. Y., with the rolling mills, machine shops and numerous other buildings formerly owned by the Troy Steel Company, part of which they have been operating under lease for the past three years. The plant is equipped with six heating furnaces, three trains of rolls, four steam and two trip hammers, and two bolt, eight rivet and two nut machines, and has an annual capacity of 50,000 tons of bars, continuous rail joints and finger bars. The property has a dock frontage on the Hudson River, is located on the New York Central Railroad, and is supplied with fresh water from the Wynantskill brook, which runs across the entire plot. The new owners have placed contracts to put the plant in first-class condition. Included in the improvements is a 1000 horse-power Corliss engine, purchased from the Hewes & Phillips Iron Works of Newark. The plant hereafter will be known as the Albany Iron & Steel Works Department of the Continuous Rail Joint Company of America, and the output of the company will be greatly increased.

The Manufacturers' Light & Heat Company of Pittsburgh, Pa., suppliers of natural gas, will lay a new 20-inch pipe line from the West Virginia gas fields into the Pittsburgh district. This line will be furnished by the National Tube Company of Pittsburgh, and will add from 65 to 70 miles to the pipe mileage owned by the Manufacturers' Light & Heat Company. This concern have increased the rates for natural gas in Canonsburg and Washington, Pa., from 20 cents net to 25 cents net for each 1000 feet. The new rates will go into effect about June 1.



## MANUFACTURING.

### Iron and Steel.

The Inland Steel Company, Chicago and Indiana Harbor, who recently increased their capital stock from \$2,000,000 to \$2,500,000, recognizing the necessity of making their plant self contained, have under consideration the building of blast furnaces and are now seeking the purchase of ore property. While no official action has been taken, it is understood that the company have recently secured additional working capital with this end in view.

The Nova Scotia Steel & Coal Company are building a new blast furnace plant at Sydney Mines, Cape Breton, Nova Scotia. All contracts have been awarded and the work is well under way. Frank C. Roberts & Co. of Philadelphia are the engineers.

The new blast furnace of the La Belle Iron Works, at Steubenville, Ohio, has been put in operation. This company are also building a second furnace which will be a duplicate of the one just started.

It is probable that the Eagle Works of the Republic Iron & Steel Company at Ironton, Ohio, now idle, will not be started up again. The plant contains 16 single puddling furnaces, 3 double puddling furnaces, 3 gas furnaces, 1 scrap furnace and 3 trains of rolls, the capacity being about 25,000 gross tons of bars and rails annually. The better part of the equipment of the plant is being dismantled and shipped to other works.

The Wheeling Steel & Iron Company of Wheeling, W. Va., recently made a large shipment of pipe to Chilcoot Pass, Alaska. They are now filling an order for a mining company there for about 18 miles of pipe from 2 to 8 inches in diameter, to be used in hydraulic mining.

The Hyle Steel Tool Company, Syracuse, N. Y., expect to decide upon the site for their new plant the latter part of the week, at which time the plans will be decided upon and the matter of equipment taken up.

The report comes from Johnstown, Pa., that, acting on the suggestion of President Stackhouse, the Cambria Steel Company will erect a blast furnace at their new Franklin plant. At present the plant is compelled to purchase its basic metal on the open market. A saving could be effected not only of manufacturing profit, but by the transfer of hot metal direct to the melting furnaces, which would also increase the capacity of the plant from 10 to 15 per cent.

The Terre Haute, Ind., mill of the Republic Iron & Steel Company closed down for an indefinite period Saturday last. The material on hand is to be sent to the Springfield, Ill., mill, which has been put in condition for profitable operation. The Terre Haute mill had 300 employees.

J. F. Seavy of Pittsburgh, supervising architect of the United States Steel Corporation, has been assigned to duty at Anderson, Ind., to superintend the construction of additional buildings at the plant of the American Steel & Wire Company. The improvements will be the most extensive of the year for the company, and will cost about \$500,000. The force of employees will be increased at the completion of the extensions from 800 to 2000 men.

### General Machinery.

The Star Machine Company, Star, N. C., recently incorporated with a capital stock of \$10,000, have equipped a plant for general machine and foundry work. The machinery, consisting of engine lathes, drill presses, shapers, key seating machines, &c., was mostly purchased through Charles M. Whitlock of Wilmington, N. C. The officers are Ernest Leach, president; John L. Tull, vice-president; G. N. Scarboro, secretary and treasurer, and John T. Jenkins, manager.

Pawling & Harnischfeger, Milwaukee, Wis., have leased the shops lately vacated by the Nordberg Mfg. Company, which they are equipping to take the place of their building which was recently destroyed by fire. These shops will be ready for operation about May 1, and in connection with their other buildings will place them in a better position than before to build cranes and hoists. All machinery has been purchased.

The Portsmouth Foundry & Machine Works, Portsmouth, Ohio, have recently made extensive improvements to their plant, adding a great deal of new machinery and in every way bettering their equipment for the manufacture of heavy castings, boilers, plate work, blast furnace, rolling mill equipment and special machine work. W. L. E. Mahon, engineer, formerly with the Brown Hoisting Machinery Company of Cleveland, has been associated with the Portsmouth company as superintendent since April 15.

The Downie-Wright Mfg. Company, York, Neb., engineers, founders and machinists, have begun the erection of a new brick machine shop which will be a much needed addition to their present shops.

A. F. Stowe & Co. of Worcester, Mass., have greatly enlarged their quarters by taking a building on Union street with 9000 square feet of floor area. New tools will be installed. Charles A. Hill, president of the Phenix Plate Company, has taken an interest in the business, and with the new capital the

firm will be able to greatly increase their product. They manufacture boot and shoe machinery.

The Mason Heater Company, Bellaire, Ohio, inform us that they will need some machinery for the improvements they are to make to their plant, but they are not yet in a position to state just what will be required. Plans call for a three-story building 100 x 110 feet.

Fenn-Sadler Machine Company, 733 Main street, Hartford, Conn., have recently added new tools to their shop and are now prepared to do duplicate flat turret work and to build special machinery.

A two-story brick plant, 37 x 137 feet, is to be built on Lackawanna street, Philadelphia, Pa., by the Globe Machine Works. The power equipment will consist of a 90 horse-power boiler, 75 horse-power Corliss engine and a 40-kw. generator. No tools will be bought at present.

The Wegner Machine Company have been incorporated at Buffalo, N. Y., to manufacture ice machines patented by Gustave A. Wegner, who is to be president of the company and will also engage in the manufacture of gas engines. The company will take over the business of the Eagle Iron Works of that city, for many years engaged in the manufacture of ice machines, gas engines for the trade and in general marine work. The management and control of the new company will be the same as in the Iron Works Company whom they supersede.

The Ploof & McKinnon Company, Jacksonville, Fla., have organized with a capital stock of \$25,000 to handle machinery and mill supplies. The directors are H. E. Ploof, J. H. McKinnon and S. E. Foster.

Northern Engineering Works, crane builders, Detroit, Mich., report recent sales of electric traveling cranes to Lambert Hoisting Engine Company, second order; Ft. Pitt Bridge Works, fourth order; Sessions Foundry Company, Waterbury Machine Company, Union Carbide Company, Webster, Camp & Lane Company, and hand cranes to Clarage Foundry Company, Winton Motor Company, Northern Electrical Works, Elk Tanning Company, Windsor Mills, Pawtucket Foundry Company and a long list of other well-known concerns. They report trade conditions better than during the corresponding period last year.

The business of Samuel R. Parry, Rochester, N. Y., has been incorporated as the Parry Machine Company. The company manufacture paper box and printing machinery.

Groman Brothers of South Bethlehem, Pa., have been awarded the contract for the erection of the new shops of the Ingersoll-Sergeant Drill Company at Phillipsburg, N. J. The foundry will be 68 x 500 feet.

The Landis Tool Company of Waynesboro, Pa., will purchase seven 30 horse-power electric motors in addition to the three motors now in use, and will operate their entire plant and the additions to be erected this summer by electricity. When completed the motors will aggregate 300 horse-power. The company are enjoying the most prosperous year of their history.

The Variety Iron Works of York, Pa., E. G. Smyser & Son's Company, proprietors, will be enlarged to meet an increased business.

A company are being organized at Carbondale, Pa., for the manufacture of a mechanical device for hoisting and attaching draw bars to railroad cars of every description. The inventor and patentee is J. W. Kipp of Sydney, N. Y. His interest has been purchased by T. V. Walker and P. H. Gilleran of Carbondale, Pa.

The Gelser Mfg. Company of Waynesboro, Pa., have secured a growing trade in Mexico. Last week a shipment of four separators, six portable engines and two straw bruisers was made to Korff, Housberg & Co., City of Mexico.

The Harrisburg Foundry & Machine Company, Harrisburg, Pa., have been awarded the contract for a 150 horse-power engine to be used to generate power for the Bureau of Standards plants of the United States Government.

The General Electric Company have plans completed for a new machine shop, to be erected at Schenectady, N. Y.

The B. F. Goodrich Company of Akron, Ohio, manufacturers of rubber products, are cramped for room in their machinery department and will erect a two-story brick addition 50 x 75 feet.

The Electric Controller & Supply Company of Cleveland have recently taken an order from the Carnegie Steel Company for a number of controllers for operating plate mill machinery.

### Power Plant Equipment.

The Regal Gas Engine Company, Coldwater, Mich., are erecting a new brick and stone building, 32 x 130 feet, two stories.

The new works of the Ball Engine Company, at Erie, Pa., are approaching completion, but will not be ready for operation for possibly three months. These works will be equipped with tools of the latest design, which will be electrically driven. The company are having a large demand for their self oiling engines, and the present works are crowded with orders. When the new plant is started both works will be operated to full capacity, in order to take care of the large amount of this business on the books.

The Union Mfg. & Power Company, Union, S. C., are developing the water power at Neal Shoals on Broad River, from which they will obtain about 8000 horse-power. The power will be used by plants now in operation in and around the town.

The Allis-Chalmers Company have temporarily abandoned their intention to improve the Gates Iron Works and the Fraser-Chalmers works at Chicago, plans for which have been prepared calling for the expenditure of over \$1,000,000.

The New Milford Power Company, New Milford, Conn., are constructing a power plant on the Housatonic River for generating electricity. About 6000 horse-power will be developed at first, and later this will probably be increased to 20,000 horse-power.

The Rhode Island Company, who operate the street railways of Providence, R. I., and vicinity, are making a large addition to their power facilities. A new power house is in process of erection, and in it will be installed four new engines, direct connected to their generators. One will be a Westinghouse of the upright type and of 8000 horse-power. The other three engines will be from the Filer & Stowell Company of Milwaukee, of 2000 horse-power each.

The city of Providence, R. I., will probably add in the near future a pumping engine of 20,000,000 gallons a day to the pumping station at Pettaconset.

The Babcock & Wilcox Company, at Philadelphia, have installed new boilers in the power house of the Tidewater Steel Company, Chester, Pa.

The Lebanon Electric Company, H. G. Clouser, president, have been awarded the contract to erect an electric power plant in the works of the West End Rolling Mill & Chain Company, in Lebanon, Pa. The plant will be built on a tract of land adjoining the mill, lately purchased for the purpose. The entire plant will be operated by electricity instead of steam.

The William A. Harris Engine Company of Providence, R. I., are contemplating erecting a new machine shop and abandoning the present shops, which they have occupied for the past 35 years. The new plant would have been started before this if the right location could have been secured. The question of site is the only obstacle in the way of a decision. Several sites have been offered, but none was just what the company wanted. The plan is to erect shops at least half as large again as the present plant, of modern machine shop construction, with one story and monitor roof, and galleries to contain the lighter tools. At the present time the shops of the company are badly crowded. Business is exceedingly good. Among the orders in hand are one for F. W. Bird & Sons of Walpole, Mass., a 600 horse-power tandem compound engine with cylinders 15 and 32 inches and 48-inch stroke. The engine is of the double portage type with triple eccentric valve motion and no wrist plate. Another order is for a 600 horse-power cross compound engine for W. T. Barker & Co. of Bennington, N. H. This engine has a 12-foot fly wheel grooved for 15 1/4-inch ropes. A heavy duty 2000 horse-power cross compound tangye engine is for the new Davis mill at Fall River, Mass. Other contracts are: 800 horse-power engine, Arlington Mills, Lawrence, Mass., this engine to be directly connected with a 600-kw generator; 1000 horse-power engine, New England Cotton Yarn Company of New Bedford, and a 1000 horse-power engine, Watts Mill, at Laurens, S. C.

The Herron-Brady Pump & Foundry Company, Chattanooga, Tenn., expect to have their new plant in operation the latter part of June. The officers are Charles Herron, president; J. E. Brady, vice-president, and P. J. Crimmins, secretary and treasurer.

A boiler of about 140 horse-power is required for the water works, Mt. Clemens, Mich. A 3,000,000-gallon Worthington pump will also be installed. Address Board of Public Works.

The State Commissioners of Lunacy, Albany, N. Y., are asking bids until May 6 for installing engine, generators, switchboard, &c., for Rochester State Hospital. E. H. Howard is superintendent.

The Lippold Valve Company, Erie, Pa., are building a new shop for the manufacture of valves in which the seat and disk can be changed under pressure. The building will be ready for operation about May 10. The machinery has been purchased from the Erie Machine Supply Company, and the engine, of 20 horse-power, from the Olin Gas Engine Company of Buffalo, N. Y.

Edward M. McCulloch of New Albany, Ind., has been appointed trustee of M. Zier & Co. of that city, boiler manufacturers, in order to wind up the company's affairs. An Eastern concern have made an offer for the plant. The affairs of the company received much publicity, on account of the conflict of an Indiana court with the Federal Court and the imprisonment of six attorneys and others connected with the receivership proceedings.

#### Foundries.

The S. Obermayer Company, manufacturers of foundry facings, supplies and equipments, are making large improvements

at their Chicago plant, Eighteenth and Rockwell streets. New machinery and buildings have just been completed which add about 40 per cent. to their present capacity at that point. During the past year improvements were made at the Cincinnati, Ohio, plant, also the Pittsburgh plant, which doubled the capacities at both places. The company have now these three plants in full operation, running each plant 20 hours per day, all of them being equipped with the most modern machinery.

The Western Malleable & Grey Iron Mfg. Company, Milwaukee, Wis., report an increase in capital stock from \$25,000 to \$100,000.

The Confectioners' Machinery & Mfg. Company of Springfield, Mass., are about to occupy a new foundry built at the rear of their shop. The new building also affords additional space in an upper story for the P. P. Emory Mfg. Company, brass and copper manufacturers.

The Malleable Iron Fittings Company of Branford, Conn., are making extensive additions to their galvanizing plant, which when completed will consist of a main building 40 x 125 feet, containing tanks and galvanizing and tinning kettles, with an extension 22 x 32 feet for stock room and shipping, and the extension now building, 27 x 42 feet, which will contain the tumbling barrels for water rolling, &c.

It is announced that several buildings now in course of construction at Trenton, N. J., for the J. L. Mott Iron Works will be greatly enlarged.

The Eureka Foundry Company, Chattanooga, Tenn., gray iron and brass castings, were incorporated last summer with a capital stock of \$25,000. Since then they have always had a good amount of work on hand. The president is John Stagner; vice-president, Leo Strahle; treasurer and secretary, R. E. Hodge, and general manager, P. W. Delaney.

Bair & Gazzam, at present operating a foundry at Third avenue and Ferry street, Pittsburgh, will remove to Smallman and Twenty-ninth streets, in that city, where a much larger foundry and machine shop will be erected.

The Peru Steel Castings plant, Peru, Ind., which has been running light for several weeks, resumed full operations Monday, the company having closed several large contracts.

The Barberton Foundry Company of Barberton, Ohio, have been incorporated for \$10,000 to do contract and custom work. The incorporators were E. R. Genet, A. P. Felzloff, Charles Guff, L. P. Wenzel and E. G. Miller. The company are preparing to erect a foundry.

#### Bridges and Buildings.

The Sneed Architectural Iron Works, Louisville, Ky., are making good progress with the construction of their new plant, three of the buildings being almost entirely completed. Practically all of the equipment has been purchased, and much of it is now ready for shipment or has arrived on the grounds.

The Boston Bridge Works of Boston, Mass., have secured the contract for the iron and steel work for the new Rhode Island State Armory, at Providence, R. I.

The Brown-Ketcham Structural Iron plant, south of Greensburg, Pa., which began operations only a few months ago with about 50 men, now employs 200. It is estimated that about 1600 tons of structural iron will be turned out this month.

The Ohio Steel Erecting Company, Incorporated, recently organized at Steubenville, Ohio, to do a structural iron and bridge erecting business, have chosen E. W. Cooper president and general manager, Jno. D. Lutz vice-president and N. V. Gaskill secretary and treasurer.

The McClintic-Marshall Construction Company of Pittsburgh have received a contract for the steel buildings of the Ford City Foundry & Machine Company, Ford City, Pa. The main building will be 105 x 500 feet.

The Riter-Conley Mfg. Company of Pittsburgh, builders of heavy plate construction, have abandoned their shops at First avenue and Short street, in Pittsburgh, their work now being centralized at their Preble avenue shops in Allegheny and the large new plant at Leetsdale, Pa. The new works embrace four buildings, each 75 feet wide and 520 feet long, equipped with electric cranes, and a power plant operated by gas engines of 1000 horse-power capacity. The company completed some time ago a very handsome office building on Water street in Pittsburgh, the first floor of which was used for a warehouse, but is now being altered to make an additional drafting room for the engineers. This will give them two floors of the office building for drafting purposes, each 48 x 160 feet.

Plans were completed last week and blue prints placed on exhibition for the erection of large bridge works by the Eastern Steel Company, on the site of the old Pioneer furnaces, at Pottsville, Pa. This plant will have double the capacity of the present bridge plant, which is being worked night and day. The several sets of angle shears, for which the company have been waiting four months, were delivered and set up last week. The company have been considerably delayed in the erection of their new works by inability to secure quick shipments of material and machinery.



**Fires.**

The manufacturing department of H. D. Scherer & Co.'s carriage works, Detroit, Mich., was damaged \$100,000 by fire April 24.

The brass and iron foundry of the Whittier Machine Company, in South Boston, Mass., was partly burned April 21, entailing a loss of about \$50,000.

A department of the plant of the National Fireproofing Company, at Perth Amboy, N. J., was destroyed by fire April 21. The loss is about \$80,000.

The Middletown Iron Works, Middletown, N. Y., were damaged \$10,000 by fire on April 21.

Fire in the factory of the National Casket Company, at Rochester, N. Y., April 20, did \$75,000 damage.

**Hardware.**

The Ohio Cultivator Company, Bellevue, Ohio, have absorbed the Ohio Hay Press Company, also of Bellevue, a recently organized company and one in which the stockholders of the Cultivator company were largely interested. The manufacture of hay presses will be conducted by the Cultivator company in a separate building.

The Colt's Patent Firearms Mfg. Company, Hartford, Conn., are making extensive changes at their armories, with a view to increasing the product of the pistol department. The company have abandoned the manufacture of printing presses, and the part of the shops formerly devoted to this class of manufacture has been added to the department for the manufacture of pistols. This demand for space is principally due to the heavy sales of the company's new automatic pistol. The company manufactured presses for the John Thomson Press Company, which company will now build its own presses in a part of one of the Colt buildings, which has been leased for the purpose. The Atlantic Screw Company, who were recently tenants of the Colt company, are occupying a new shop erected in the same neighborhood.

Edward Miller & Co., manufacturers of lamps and lamp trimmings, of Meriden, Conn., are making preparations for the addition of gas and electric fixtures to their present line. They have recently erected a four-story building 100 feet long, and have installed a secondary engine. These changes are not only on account of the addition of new products, but also to meet the general increasing demand.

The Simeon L. and George H. Rogers Company, Hartford, Conn., have taken the factory building on Market street in that city, formerly known as Factory H of the International Silver Company. The change gives the company a good deal of additional room.

The Capewell Horse Nail Company, Hartford, Conn., are equipping their new factory, 100 x 330 feet on the ground, three stories and basement. The building replaces one burned last summer. The first story was completed some time ago to answer the immediate requirements of the business, and the remainder of the new building has been erected over it. Building operations were only slightly delayed by a recent strike.

A permit has been granted to the Gorham Mfg. Company, silversmiths, Providence, R. I., to construct a three-story brick factory.

William T. Wood & Co., Arlington, Mass., are building an addition to their plant 35 x 50 feet, of wood, two stories and basement. The office will be located in the new building and the space now occupied by the office will be added to the machine shop. They refer to the business outlook with them as very favorable, and they are in receipt of a number of foreign orders, particularly from Norway.

American Bolt & Screw Case Company, Dayton, Ohio, manufacturers of improved revolving cases for bolts, screws, bicycle repairs, tools, &c., report an excellent demand from hardware dealers, machine shops, pattern shops, &c. These cases are found to be a great convenience by those who have them in use.

The Barnes Mfg. Company, manufacturers of pumps, Mansfield, Ohio, are building a new enameling plant for the purpose of turning out high class plumbers' enameled ware, including sinks, lavatories and a general line. They have secured the services of an expert enameler and hope to be in a position to ship enameled goods in about 90 days.

The Alexander Mfg. Company, Canonsburg, Pa., manufacturers of the Alexander patent Acme stove pipe and corrugated elbows, have resumed operations and are now in position to turn out a large quantity of goods. C. J. Wolfe has been made general manager of the business. The company report enough large orders to keep the factory busy until next October.

The Anderson Chilled Plow Company, South Bend, Ind., will rebuild their plant, which was recently destroyed by fire. The main building will be of brick, 80 x 420 feet.

The Standard Disk Plow Company, Chattanooga, Tenn., contemplate the erection of a new plant in that city in the near future, to cost \$30,000, the main building of which will be about 200 feet square. The company will manufacture disk plows of various sizes, making a specialty of a plow designed by a Southern inventor.

The Oliver Chilled Plow Works of South Bend, Ind., have placed a contract for an extension to their plant, consisting of four buildings, the dimensions of which are as follows: 100 x 450, 100 x 500, 80 x 475 and 270 x 354 feet. The first three will be one-story structures and the last a four-story warehouse.

The Wrought Washer Mfg. Company, Milwaukee, Wis., have just added 2½ acres of land to their extensive plant. They are making many additional improvements which, when completed, will increase their output. They state that they are receiving orders from almost all of the principal cities in the country, and are also doing a considerable export trade. Although the demand for their class of goods has been unusual, they have been in a position to make reasonably prompt delivery.

The Midland Iron Works, Racine, Wis., have increased the capital stock of the company from \$10,000 to \$25,000, to provide funds for the construction of a new building, to purchase additional machinery, and for working capital. The company report a rapidly increasing demand for their product, the Wilbern adjustable door hanger and gravity fire door equipment.

The Morgan Spring Company, Worcester, Mass., have taken a lease of one floor of the Gilbert Building in that city, which will afford them 5000 square feet of new floor area. The demand for the snap clasp which the company got out last summer has become so great that additional room was necessary, and it was decided to lease room instead of adding to the company's plant at Barber's Crossing. All of the new space will be given over to the snap clasp department.

The National Automatic Needle Company is the name of a new corporation who have begun the erection of a factory at Springfield, Mass. The building will be 40 x 300 feet and three stories in height, and is intended to be one wing of a larger plant to be ultimately built if the business warrants it. The plans call for another wing of the same size, with a connecting building at the rear, the two wings converging from 60 feet apart at the rear to 100 feet at the front, where an office building will be erected. The automatic needle to be manufactured is a self threading device. The company are incorporated under the laws of New York, with an authorized capital stock of \$1,000,000. The officers are: President, John D. Gill of Springfield; vice-president, George A. Manwaring of New York; treasurer, James E. Lytle of New York; secretary, J. Boyer Lytle of New York. These officers and George Carragan of New York constitute the Board of Directors.

Smith & Wesson, Springfield, Mass., pistol manufacturers, are erecting a new building at their plant, 40 x 60 feet on the ground and four stories high. The purpose of the addition is generally to increase the capacity of the shops.

The report that the American Axe & Tool Company would very much enlarge their plant at Glassport, Pa., is incorrect. We may state that the new plant of this concern at Glassport is about completed and is being started up.

Wabash Screen Door Company, 1120-1123 Marquette Building, Chicago, have recently moved into their new plant at Minneapolis, Minn., from the two temporary factories they have been operating in that city since the burning of their plant in Rhinelander, Wis., in December, 1901, and are beginning to feel that they are now back into business in good form. Their new factory is perhaps the finest of its kind in the country, with 250,000 square feet of floor space. It is of modern mill construction and equipped with every modern appliance used in the manufacture of their line. This new plant, with the plant of equal capacity at Memphis, Tenn., built in 1901, gives them a capacity of five carloads of screen goods per day, which, we are advised, is being fully taken up this season. Conditions of the market in screen goods are said to be very gratifying, and the company are enjoying a satisfactory volume of business, which with their enlarged capacity they are finding it possible to take care of with reasonable promptness for the first season since they have been in business.

D. A. Raiff, M. Q. Baker, H. D. Beach, W. R. McCurdy and other prominent business men of Coshocton, Ohio, are organizing a company to have \$50,000 capital for the manufacture of enamel ware. They will establish a factory in that place.

**Miscellaneous.**

The Michigan Novelty Works, which were organized about a year ago at Vicksburg, Mich., by Clark Bros., finding that the growth of their business demands the facilities afforded by a larger city, have moved to Kalamazoo, where they will occupy the building formerly used by the Kalamazoo Cycle Company. The company manufacture tools, novelties in wood and metal and plated ware.

Report has it that A. Clement, automobile manufacturer, of Paris, France, will erect new and large shops in Hartford, Conn. M. Clement has a branch factory in that city, where automobile motors are manufactured, and ultimately it is expected that this plant will prove insufficient for its purpose. When that time comes it is pretty certain that a large establishment will be built, but no definite plans have been made to that end.

A majority of the stockholders of the Mansfield Coal & Coke Company, at Pittsburgh, have given an option on their holdings at \$200 a share, with the condition that the same price is to be



given to all stockholders in case they desire to sell. The company are capitalized at \$250,000, the par value of the stock being \$50 a share. For several years past, however, they have been paying dividends at the rate of 30 per cent. annually. It is said the Pittsburgh Coal Company are the purchasers.

The Plunger Elevator Company of Worcester, Mass., have the contracts for the two elevators for the Penn Mutual Building, Boston; three elevators for the new Easton Building, Boston; four elevators for the State Mutual Building, Boston; five for the Horne Building, Pittsburgh, Pa., and three for the Victoria Hotel, New York.

The Johns-Pratt Company of Hartford, Conn., manufacturers of electrical supplies, are making large additions to their plant. Two additions, each 35 x 70 feet and three stories high, are nearly completed, and the space between two other buildings will be filled in, altogether adding 25 per cent. to the plant.

The Whitney Mfg. Company of Hartford, Conn., manufacturers of automobile chains and other automobile parts, are so rushed with orders that new machinery is being added.

The freestone quarries of the Neshannock Valley, operated by the Pennsylvania Stone Company of Youngstown, Ohio, and by the Harrison Fire Stone Company of New Castle, are erecting crushing plants.

The Youngstown Lead & Zinc Company have been organized at Youngstown, Ohio, with a capital of \$600,000. J. Craig Smith is president.

The Ashland Steel Range & Mfg. Company of Ashland, Ohio, have been incorporated to manufacture and deal in steel ranges.

The Waterbury Clock Company of Waterbury, Conn., are to erect a brick factory building, 43 x 116 feet on the ground, five stories and a basement in height. The purpose of this addition to the plant is to provide additional space for general factory purposes.

The Central Electric Company, recently organized at Youngstown, Ohio, have purchased patents for electrical indicators and weight recorders. They will build a new plant at Struthers, Ohio, for the manufacture of these machines.

The McIntosh Wagon Company is the name of a new industry organized at Rock River, Wis., with a capital stock of \$40,000, of which R. A. Stockbauer, P. J. Savage and Fred. F. Moe are the incorporators.

The Michigan Tin Can Company, Limited, Detroit, Mich., have purchased the plant and equipment of the Michigan Can Company. The capital stock of the new company is \$100,000. M. C. Weil is president, Eugene H. Sloman treasurer and C. B. Cavanagh secretary. The capacity of the plant, which is now 30,000 cans per day, will be increased to 60,000 within the next 60 days. The company also contemplate the addition of a two-story brick building to the present plant.

The Jones Cycle & Automobile Company are a newly organized and incorporated manufacturing concern at Portland, Ind., F. Bimel, J. A. Richardson, W. Detamore, C. D. Ames and A. V. Jones being among the incorporators.

The W. H. Smith Company are a new belting and mill supply concern at 38 South Meridian street, Indianapolis, Ind. Associated with Mr. Smith is his son, Arthur T. Smith. W. H. Smith was formerly of the firm of Taylor & Smith, recently dissolved, and who were succeeded by the Taylor Belting Company, made up of W. A. Taylor, president; Edward Taylor, Wm. J. Taylor and Newton Todd.

The United Wire & Supply Company, 109 Summer street, Providence, R. I., have under construction a two-story brick addition to their factory.

The Vesta Knitting Mills, Providence, R. I., will build a five-story brick factory to adjoin their plant at the corner of Elm and Blount streets. A small amount of power equipment will be needed, including new motors. Rudolph Berry is president and manager.

The Acorn Brass Mfg. Company, Chicago, Ill., announce their return to their old address, Green, Fulton and Peoria streets, where they were burned out last December. In rebuilding the company have made many improvements, which, with a complete equipment of modern machinery, place them in a better position than ever before to manufacture complete or in part anything in brass goods.

The United States Headlight Company of Buffalo, N. Y., have purchased a site for a new plant in that city, at the corner of Letchworth & Dart streets, with a frontage on the tracks of the New York Central Railroad, and will at once erect a new factory building, which will be 400 feet in length and two stories in height. It will be of mill construction, modern in every respect, and give the company greatly increased facilities. A separate power house will be erected.

The D. T. Owen Company, recently organized at Cleveland to manufacture a newly patented combination folding bed, have purchased 3 acres of land at Doan street and the Nickel Plate crossing, that city, and will erect two buildings, one 112 x 204 and the other 40 x 50 feet. D. T. Owen was formerly with the ornamental department of the W. S. Tyler Company of Cleveland, but resigned to organize the new company.

At the annual meeting of the stockholders of the Joseph

Dixon Crucible Company, in Jersey City, N. J., April 20, the old Board of Directors, consisting of Edward F. C. Young, John A. Walker, William Murray, Joseph D. Bedle, Edward L. Young, George T. Smith and George E. Long, was re-elected. President E. F. C. Young, Vice-President and Treasurer John A. Walker and Secretary George E. Long were re-elected by the directors. Joseph D. Bedle was also re-elected as counsel.

The National Fire Proofing Company of Youngstown, Ohio, have secured an order from the First National Bank of Chicago for a complete equipment of all steel furniture, desks, and, in fact, the entire furnishing of the bank. They have also secured a contract from the American Insurance Company of Newark, N. J., for a large amount of all steel furnishings, consisting of desks, bookcases and other office fixtures. The National Fire Proofing Company make a specialty of the manufacture of all steel office equipment, and have secured a very large amount of work, and are running their plant to its full capacity.

The Conneaut Can Company of Conneaut, Ohio, manufacturers of tin cans, decided last week to make extensive improvements to their plant. They will erect a new building, 40 x 175 feet, which will be used as general workshop, cooper shop and warehouse. The present warehouse will be filled with machinery, and the improvements will increase their facilities fully 50 per cent. The new building will face on a siding from the Lake Shore & Michigan Southern Railway, greatly improving their shipping facilities. It is their intention to take up the manufacture of square and oblong cans for holding syrup, paints, oils, varnishes, &c. Heretofore they have made only round cans.

On Monday, April 20, stockholders of the Manufacturers Light & Heat Company of Pittsburgh voted in favor of the merger of the Pennsylvania gas companies under their control into one company having a capital of \$25,000,000. The companies to be absorbed are the Manufacturers' Light & Heat Company, Fort Pitt Gas Company, Waynesburg Natural Gas Company, Citizens' Natural Gas Company, Relief Gas Company, Mutual Benefit Gas Company and the Canonsburg Light & Fuel Company. The stockholders of the Manufacturers' Light & Heat Company also voted to increase the indebtedness of the company from \$599,000 to \$3,099,000, collateral trust bonds to be issued for \$2,500,000. These are to cover the stock of the Wheeling Natural Gas Company secured some time ago. When these various gas companies have been merged into one organization the Manufacturers' Light & Heat Company of Pittsburgh will be the largest natural gas company in the world.

The National Gear Company of Akron, Ohio, have incorporated with \$30,000 capital stock, to manufacture vehicle gears of all kinds. Incorporators: T. F. Cleveland, Herbert S. Hull, Charles W. F. Clause, James H. Nichols and W. E. Slaybaugh. Mr. Nichols was formerly foreman of the Akron Gear Company. They will occupy a factory at Ravenna, Ohio, but their offices will be at Akron.

The Aultman & Taylor Company of Mansfield, Ohio, are preparing to erect a fire proof pattern vault adjoining their plant.

The Steel Storage & Elevator Construction Company of Buffalo, N. Y., are completing a steel bin elevator at Fort William, Ontario, on Lake Superior, of 1,750,000 bushels capacity, and expect to have it ready for operation about May 1. They are also building a steel bin elevator on concrete foundations at Montreal, Que., which will have a capacity of 1,000,000 bushels, and will have it completed early next fall. The last named elevator is to be operated by electricity. The machinery and electrical apparatus have not as yet been contracted for.

The Woolsey Wheel Company of Sandusky, Ohio, are preparing to go into the manufacture of wheels for automobiles. Henry Greafe, president of the company, has invented a new method of attaching spokes, and the company will install new machinery to take up the manufacture of the article.

Dr. Thomas H. Hicks of Ft. Wayne, Ind., recently gave a public test of a gold and silver extracting machine of his invention before mining men of Indiana, Ohio and West Virginia. The machine was built at the Bass Foundry, Ft. Wayne. The test is said to have been successful. About a ton of rebellious ore was put through.

At Jefferson, Ohio, on April 27, a deed was filed conveying 13 parcels of land in Geneva, Ohio, aggregating 340 acres. This deed was first filed to W. W. Ford and afterward by him to the Jones & Laughlin Steel Company of Pittsburgh. No consideration is given in any of the deeds. It is probable that this land has been acquired by the Jones & Laughlin Steel Company in order to carry out their project of building a railroad from the lakes to Pittsburgh.

The American Ball Bearing Company of Cleveland, manufacturers of ball bearings of all kinds, have found it necessary to increase their facilities and have purchased a 6-acre site on the Lake Shore & Michigan Southern Railway tracks and Lake avenue, and will erect a three-story brick factory, 200 x 208 feet. They will install considerable new machinery, much of it automatic screw machinery. Power will be furnished by a 250 horsepower cross compound engine, which will be direct connected to a 150-kw. alternating current generator, and all machinery will be operated by independent motors.

The Cleveland Water Works Department of Cleveland have awarded a contract to the Cleveland Steam Boiler Works Company for a large amount of riveted steel pipe for the new water works plant in that city.

The Oshkosh Logging Tool Company, Oshkosh, Wis., have not yet decided just what new machinery they will purchase for their new plant. The first building to be erected will be 65 x 150 feet, two stories, and this will be followed by several additional buildings which will be erected during the summer.

All the required machinery has been purchased and the contracts let for the new building and heating plant of the Eclipse Gas Stove Company, Rockford, Ill. It is expected that the building will be occupied the latter part of August.

Plans are now ready and estimates are being received for the new gas meter plant of John J. Griffin & Co., Philadelphia, Pa. The building will be fire proof, 90 x 120 feet.

The Osceola Foundry & Specialty Company, Osceola, Ind., recently organized with a capital stock of \$10,000, will erect a plant for the manufacture of a bottling device and other novelties, and will do general machine work. Castings in brass, aluminum, &c., will also be made. The electric plating department was purchased from Hanson, Van Winkle & Co. and Bennett & O'Connell Company of Chicago. The officers are: Charles T. White, president and general manager; Orlando Becher, vice-president; Edward Creegan, secretary, and C. S. Copp, treasurer.

## Philadelphia.

PHILADELPHIA, Pa., April 29, 1903.

The most notable feature in the Iron and Steel trade is its dullness. It should not be understood that consumption is falling off or that deliveries are not well taken, but it is a fact that new business is light. Buyers take whatever they need for May and June, but beyond that they persistently stand aside. Some orders are on the books for deliveries during the last half of the year, but additions during the past week have been very small and there appears to be less disposition than ever to increase them. Under these circumstances it is remarkable what a bold front sellers maintain. It is not because they do not believe in lower prices, but because attempts to secure business would stand very little chance of being successful, on the principle that a horse may be taken to the water but he cannot be made to drink. This is not a good feature, although there is no reason for supposing that it is because of unsound conditions. All that is wrong with the markets is that Pig Iron is too high, and consumers are determined to secure a readjustment in prices. Last year the scarcity of fuel, labor, railway facilities, &c., enabled producers to name their own terms. This year there is no such restriction, consequently buyers will be better able to have their say in the matter. How soon and to what extent is a problem that is yet to be worked out, but that it is nearing its solution is beyond question. The situation, therefore, may be summarized as follows: Good prospects for large consumption with a moral certainty that prices of Pig Iron will work toward lower figures.

A party of officials of the National Tube Company is now inspecting the plants of that company located in the Pittsburgh district and in the Central West. The start was made from Pittsburgh on Tuesday, the first plants inspected being the Pennsylvania department in Pittsburgh and the National department in McKeesport. On Wednesday the Riverside department in Wheeling will be inspected and then the various works at Lorain and Shelby, Ohio, and other Western points. The party includes William S. Schiller, president of the National Tube Company; Edward Worcester, first vice-president, and John D. Culbertson, second vice-president of the National Tube Company; Peter Bond, general superintendent; P. C. Patterson, mechanical engineer; J. F. Townsend, traffic manager; George G. Crawford, manager of the National department at McKeesport, and J. H. Nicholson, assistant to the president of the Shelby Steel Tube Company. William B. Schiller, president, states that work on the new plants to be erected at McKeesport will be started at once, but it will take several years to build the new works on account of their great size and the many buildings to be erected. At Lorain, Ohio, the National Tube Company are getting ready to build a large new tube works at that place. The city will at once start the work of making Black River navigable further up, so as to allow ore boats to come up to the new blast furnaces, which are to be built.

The Thomas Iron Company of Hokendauqua, Pa., have blown in an additional furnace on basic iron.

## PERSONAL.

Francis H. Clergue has presented his resignation as vice-president of the Consolidated Lake Superior Company, of whom he was the chief promoter. He will continue as a member of the Board of Directors. Henry K. McIlarg, who is a large stockholder in the concern, has been elected a director of the company.

R. A. Hadfield of Sheffield, England, who is well known in connection with the development of manganese steel, is expected to arrive in this country at an early date.

F. E. Drake has been elected president of the Lanyon Zinc Company, vice J. S. Rodgers, who has been made managing director of the company. Since the Paris Exposition, where Mr. Drake occupied a position as director of machinery and electricity, he has been doing special advisory work in Germany.

H. Lueg of Haniel & Lueg of Duesseldorf, one of the largest machinery builders of Germany, is now visiting this country. Herr Lueg was president of the Duesseldorf Exposition last year. He is accompanied by his son.

Frank Jeffrey, formerly superintendent of the West Bay City Shipbuilding Company's yard, West Bay City, Mich., has been appointed vice-president and general manager of the Union Iron Works, San Francisco, Cal.

Theodore N. Ely, superintendent of motive power of the Pennsylvania Railroad, has been elected a member of the Executive Committee of the American Railway Association.

Last year G. G. McMurtry, president of the American Sheet Steel Company, founder of the town of Vandergrift, Pa., arranged that four ministers of churches of the town made a tour of Europe. The results were so encouraging that Mr. McMurtry is providing for a similar visit on the part of four other clergymen, among them a Catholic priest.

J. F. Donahue, who was formerly connected with the Oliver Iron & Steel Company at Pittsburgh, has accepted the position of manager of sales of the New Castle Forge & Bolt Company, New Castle, Pa.

**The Wonham-Magor Steel Car Works.**—A party of about 40 members of the machinery and railway supply trades and engineering fraternity of New York and vicinity, together with several ladies, were guests of the Wonham-Magor Engineering Works last Saturday afternoon. The principal offices of this company are located at 29 Broadway, New York, and a new plant of the company is turning out steel cars at a rapid rate at Passaic, N. J. It was for the inspection of the new plant that the members of the firm and their guests left Hoboken for Passaic in a private car on the day mentioned. The trip was enjoyable as well as instructive, for besides seeing what excellent equipment, system and management will do in building up riveted steel cars, the guests saw what sociability and, by the way, a refreshment booth will do toward counteracting otherwise weighty topics. The new plant is admirably located on a branch of the Delaware, Lackawanna & Western Railroad, and is equipped with thoroughly modern machinery. An order for 20 hopper type steel cars of 400 cubic feet capacity each is being executed at the present time. The cars are for the Valedina (Mexico) plant of the American Smelting & Refining Company.

**The Harvester Company's Strike.**—(By Telegraph.)—CHICAGO, April 29, 1903.—Only about 600 machinists and metal workers in the employ of the Deering branch of the International Harvester Company are on strike, instead of 2000 as sensationally reported, and only 71 out of a total of 7000 employed are absent from the McCormick branch. Both plants are running in all departments, notwithstanding the disaffection among the employees. The strike was inaugurated by the demand for union recognition, but demands are now being formulated for increased wages, better working conditions and the abolition of accident and death contracts.



## The Iron and Metal Trades.

The week has been a busy one in Cleveland in the contracting for freights for Ore to lower lake ports, it being estimated that an aggregate tonnage of 20,000,000 tons is now taken care of. The feature of the charters is that they extend to November 30, as against November 10 in former years.

The Foundry Iron markets are dull in all quarters, and what business has been done in the Central West in Southern Pig has been put through by outside furnace interests on the basis of \$16.50, Birmingham, so that the differential has practically disappeared. On the whole the market is softer.

Basic Pig, notably in the East, is scarce, and the market is closely cleaned up. One transaction, involving 10,000 tons for immediate delivery, is reported, the Iron having been sold by a furnace in Eastern Pennsylvania to a Steel plant in the Philadelphia district.

In the Pittsburgh district there has been somewhat more urgent offering of Bessemer Pig by outside interests, the leading company not taking any Iron. Sales have been made aggregating from 35,000 to 40,000 tons, and the market is now at \$19, at Valley furnace, for delivery over the second half.

Chicago reports a very urgent demand for Steel Billets, the shortage being estimated at about 50,000 tons. Some business has been done in foreign Steel at \$32.75 delivered Chicago, while some Slabs, Sheets and Bars have been sold in the Eastern territory. The pressure for Steel to meet the season's requirements for certain lines of finished goods continues urgent. Thus the coming canning requirements are reflected in heavy deliveries of Tin Plate Bars to the Tin Plate makers. The Wire mills, too, are crowding the Steel works for metal.

As we go to press, large sales of German Billets are reported at \$29, which has resulted in offerings of American Steel.

New business is coming along only to a moderate extent, although this causes relief rather than alarm, because it gives the manufacturers a chance to catch up. The Rail trade is heavily engaged for a long time to come, but some makers are making efforts in spite of this to recover the Pacific Coast and Canadian markets.

The Structural mills report further fair orders, both for buildings and for bridges.

Agricultural Implement makers in the Pittsburgh and Chicago districts have taken some tonnage of Steel Bars, but on the whole the market is quiet, and in the East is rather inclined to ease off.

A new natural gas enterprise has called for about 70 miles of Pipe.

In some departments the labor troubles have been adjusted. In others they are cropping up, although not very seriously. Business is too good to fight, but that does not mean that concessions are to go on endlessly. There will have to be a tremendous wages readjustment when the markets turn.

## A Comparison of Prices.

Advances Over the Previous Month in Heavy Type,  
Declines in Italics.

At date, one week, one month and one year previous.

	Apr. 29, 1903.	Apr. 22, 1903.	Apr. 1, 1903.	Apr. 30, 1902.
<b>PIG IRON:</b>				
Foundry Pig No. 2, Standard, Philadelphia .....	\$21.25	\$21.25	\$22.25	\$19.75
Foundry Pig No. 2, Southern, Cincinnati .....	19.75	20.25	20.25	17.75
Foundry Pig No. 2, Local, Chicago .....	22.80	22.80	22.50	19.50
Bessemer Pig, Pittsburgh .....	20.85	20.85	21.85	20.00
Gray Forge, Pittsburgh .....	20.25	20.25	20.75	19.75
Lake Superior Charcoal, Chicago .....	25.00	25.00	26.00	22.50

### BILLETS, RAILS, ETC.:

Steel Billets, Pittsburgh .....	30.50	30.50	30.00	32.00
Steel Billets, Philadelphia .....		\$29.50	\$29.00	33.00
Steel Billets, Chicago .....	\$32.75	31.25	31.50	....
Wire Rods, Pittsburgh .....	37.00	37.00	37.00	36.50
Steel Rails, Heavy, Eastern Mill .....	28.00	28.00	28.00	28.00

### OLD MATERIAL:

O. Steel Rails, Chicago .....	18.50	18.50	18.50	17.50
O. Steel Rails, Philadelphia .....	21.50	21.50	21.25	21.00
O. Iron Rails, Chicago .....	24.50	24.50	24.50	24.00
O. Iron Rails, Philadelphia .....	25.00	25.00	24.50	26.00
O. Car Wheels, Chicago .....	24.00	24.00	24.00	19.00
O. Car Wheels, Philadelphia .....	24.00	24.00	24.50	19.50
Heavy Steel Scrap, Pittsburgh .....	21.50	21.50	21.50	....
Heavy Steel Scrap, Chicago .....	18.50	18.50	18.25	16.50

### FINISHED IRON AND STEEL:

Refined Iron Bars, Philadelphia .....	1.93½	1.93½	1.93½	1.92
Common Iron Bars, Chicago .....	1.80	1.80	1.80	1.90
Common Iron Bars, Pittsburgh .....	1.85	1.85	1.85	....
Steel Bars, Tidewater .....	1.75	1.75	1.75	1.80
Steel Bars, Pittsburgh .....	1.60	1.60	1.60	1.60
Tank Plates, Tidewater .....	1.85	1.85	1.80	1.95
Tank Plates, Pittsburgh .....	1.60	1.60	1.60	1.60
Beams, Tidewater .....	1.73½	1.73½	1.75	1.95
Beams, Pittsburgh .....	1.60	1.60	1.60	1.70
Angles, Tidewater .....	1.73½	1.73½	1.75	1.85
Angles, Pittsburgh .....	1.60	1.60	1.60	1.60
Skelp, Grooved Iron, Pittsburgh .....	2.05	2.00	2.00	2.10
Skelp, Sheared Iron, Pittsburgh .....	2.10	2.05	2.10	2.15
Sheets, No. 27, Pittsburgh .....	2.65	2.65	2.65	3.00
Barb Wire, f.o.b. Pittsburgh .....	2.60	2.60	2.60	2.90
Wire Nails, f.o.b. Pittsburgh .....	2.00	2.00	2.00	2.05
Cut Nails, f.o.b. Pittsburgh .....	2.15	2.15	2.15	2.05

### METALS:

Copper, New York .....	14.75	15.00	15.00	11.75
Spelter, St. Louis .....	5.50	5.40	5.40	4.15
Lead, New York .....	4.37½	4.65	4.65	4.10
Lead, St. Louis .....	4.25	4.57½	4.57½	4.00
Tin, New York .....	30.05	29.50	30.00	28.25
Antimony, Hallett, New York .....	7.00	7.00	7.00	8.00
Nickel, New York .....	40.00	40.00	40.00	50.00
Tin Plate, Domestic, Bessemer, 100 pounds, New York .....	3.99	3.99	3.99	4.19

\* Foreign.

## Chicago.

FISHER BUILDING, April 29, 1903.—(By Telegraph.)

As far as new business is concerned, in both Iron and Steel, the past week has been conspicuous more for dullness than any other one feature. In many lines there has been a natural falling off in trade incidental to the season, but the one element most responsible for the decreased volume of business is the unrest of labor, made manifest by demands for shorter hours and increased wages, and resulting in strikes. The machinists, molders, core makers and chippers have all made demands upon employers for some concessions. On Monday the metal workers, several thousand strong, inaugurated a strike to obtain recognition of the union; several other organizations have called sympathetic strikes, and until these chaotic conditions give place to order and harmony business will naturally suffer. There seems reason in the belief that difficulties arising from labor troubles are magnified, but the agitation is certainly effective in calling a halt in some lines. Pig Iron has continued to show the effects of the holding off of large buyers, but the belief or knowledge that a heavy tonnage must be placed for the last half of the year impels furnaces to make but little change in their previous attitude. The tendency, however, is toward a further yielding of the market. Bar mills, both Iron and Steel, are in need of much tonnage, and stocks of Structural Material in the hands of distributors and consumers are rather larger than smaller than for some months; yet with large contracts pending for bridges and buildings the mills preserve a very firm tone. Plates and Rails continue very strong, with premiums obtained on the former early shipments. Sheets do not appear as strong as a week ago, but Billets continue very scarce and com-

mand relatively very high prices. Further sales of Wire Rods have been made at prices which seem to net the manufacturer but scant profit. Merchant Pipe and Boiler Tubes have sold more readily, and a few more contracts for Merchant Steel have been placed by agricultural implement manufacturers. Scrap material has shown a weakening tendency and freer offerings of Coke are responsible for weakness in that commodity.

**Pig Iron.**—The aggregate tonnage of orders for Pig Iron placed during the week has increased but little, if any, the majority of buyers being still indisposed to cover their requirements for the last half of the year. Most of the trading has been for small lots and for delivery during the next two months, although in some instances contracts have extended over into the third quarter. The general tendency has been toward a settling down to a lower but firmer basis, to a point at which it seems likely that consumers will be attracted to the extent at least of covering a portion of their requirements. Interest is centered principally upon one small contract of 5000 tons, equally divided between No. 2 and No. 3 Foundry, to be placed Wednesday by a car company, and the active competition for this business better reveals the true situation than anything that has happened for several months. While there has been some inquiry for Basic and Malleable grades, trading has been mainly in Southern Coke Foundry Iron, sales of between 800 and 1000 tons of No. 2 having been made during the past few days in small lots on the basis of \$16.50, Birmingham, for quick shipment. This price also has been asked for deliveries during the last half of the year, but buyers have been encouraged to demand even concessions from this price. About 1000 tons of No. 3 Foundry have been reported sold at \$16, and moderate amounts of No. 4 Foundry and Gray Forge at \$16 and \$15.50 for Birmingham, respectively. Other furnaces again have refused \$16 for No. 4. Standard Bessemer has been offered at \$21.75, Chicago, and Malleable Bessemer has been held at the same price. One interesting sale is that of 5000 tons of Missouri Low Phosphorus Iron, said to have been sold to a car company at about \$22, St. Louis. Single car lots of Southern No. 2 Foundry, Nos. 1 and 2 Soft have been sold on the basis of quotations. Virginia Basic Iron is said to be available at about \$21, Chicago, but buyers who were in the market a week ago have retired. Some little Silvery Iron has been offered by speculative interests at from \$1 to \$2 under furnace prices without attracting buyers. There has been very little local Iron available and the disposition of both furnaces and buyers has been to await further developments before contracting for the last six months of the year. Sales of Nos. 1, 2, 3 and 4 Charcoal Iron have been made together at \$26 for early shipment. The following are the prices current, f.o.b. cars Chicago, either for quick shipment or for the last half of the year, trading being mainly at the inside prices:

Lake Superior Charcoal.....	\$25.00 to \$26.00
Local Coke Foundry, No. 1.....	23.30 to 23.80
Local Coke Foundry, No. 2.....	22.80 to 23.30
Local Coke Foundry, No. 3.....	21.50 to 22.00
Local Scotch, No. 1.....	23.00 to 23.50
Ohio Strong Softeners, No. 1.....	25.80 to 26.80
Southern Silvery, according to Silicon.....	23.35 to 25.35
Southern Coke, No. 1.....	21.50 to 22.00
Southern Coke, No. 2.....	20.85 to 21.35
Southern Coke, No. 3.....	20.35 to 20.85
Southern Coke, No. 1 Soft.....	21.50 to 22.00
Southern Coke, No. 2 Soft.....	20.85 to 21.35
Foundry Forge.....	19.85 to 20.35
Southern Gray Forge.....	19.35 to 19.85
Southern Mottled.....	19.35 to 19.85
Southern Charcoal Softeners, according to Silicon.....	25.85 to 27.85
Alabama and Georgia Car Wheel.....	29.35 to 30.35
Malleable Bessemer.....	21.50 to 22.00
Standard Bessemer.....	21.75 to 22.00
Jackson County and Kentucky Silvery, 6 to 8 per cent. Silicon.....	30.30 to 31.30

**Bars.**—There is still an indisposition to place large orders for Soft Steel Bars or Bar Iron, buyers being convinced that nothing is to be gained by covering for the entire year, especially while the labor market is so unsettled. However, a few railroads and agricultural implement manufacturers have placed contracts for Steel Bars ranging between 1000 and 2000 tons each for delivery extending to January 1, and in some cases to May 1, 1904. The aggregate sales reported, however, have not been over 5000 tons, but there has continued to be satisfactory specifying on old contracts. Bar Iron has been unusually quiet, there being few if any individual orders as large as 500 tons, and most of the transactions have been on the basis of 1.85c., Chicago. The car shops which have recently taken orders seem to have covered requirements, at least temporarily. The following are the prices current, f.o.b. cars, Chicago, mill shipment: Bar Iron, 1.80c. to 1.90c.; Soft Steel Bars, 1.76½c. to 1.86½c.; Hoops, 2.16½c. to 2.26½c.; Angles, under 3 inches, 1.86½c. to 1.91½c., base. The merchant trade has been moderately active and the market steady at the following prices: Bar Iron, 2.15c.; Soft Steel Bars, 2c. to 2.25c.; Angles, 2.25c., and Hoops, 2.40c., base, from store.

**Structural Material.**—The market has been unusually quiet, the aggregate sales for the week being considerable.

The important contracts previously alluded to seem to be held in abeyance pending the outcome of the labor controversies. The tone of the market continues firm and prices are unchanged as follows at Chicago for mill shipment: Beams Channels and Zees, 15 inches and under, 1.75c. to 1.90c.; 18 inches and over, 1.85c. to 2c.; Angles, 1.75c. to 1.90c. rates; Tees, 1.80c. to 1.90c.; Universal Plates, 2c. to 2.25c. The demand for quick shipment from local stocks has been fair and the market has remained steady at the following prices: Beams and Channels, 2¼c. to 2½c.; Angles, 2.25c. to 2.50c.; Tees, 2.30c. to 2.55c., at local yards.

**Plates.**—No large contracts have been placed during the week, but there are several important contracts under negotiations and delayed because of the inability of the mills to make the deliveries desired. Where it is possible to make early shipments premiums of \$1 to \$2 per ton are obtained over official prices, and some business in a few 100-ton lots has been done on this basis. The following are the official prices, f.o.b. cars, Chicago, mill shipment: Tank Steel, ¼-inch and heavier, 1.75c. to 2c.; Flange, 1.85c. to 2.15c.; Marine, 1.95c. to 2.10. Most of the local distributors have a fair stock and are making quick shipments, there being a good demand and prices unchanged as follows: Steel, ¼-inch and heavier, 2.15c. to 2.20c.; Tank Steel, 3-16-inch, 2.25c. to 2.30c.; No. 8, 2.30c. to 2.40c.; Flange Steel, 2.40c. to 2.50c., all f.o.b. warehouse, Chicago.

**Sheets.**—While there has been a fair demand for both Black and Galvanized Sheets, it is evident that competition is too active to admit of higher prices for mill shipments, there being still some irregularity and ample supply. Sales direct from manufacturers are being made on the basis of 2.75c., Pittsburgh, or 2.91½c. Chicago, for No. 28. The following prices are those asked by second hands for Black Sheets, carload lots, Chicago, mill shipment: No. 10, 2.12½c. to 2.16½c.; No. 12, 2.22½c. to 2.26½c.; No. 14, 2.32½c. to 2.36½c.; No. 16, 2.42½c. to 2.46½c.; Nos. 18 and 20, 2.56½c. to 2.60½c.; Nos. 22 and 24, 2.66½c. to 2.70½c.; No. 26, 2.76½c. to 2.80½c.; No. 27, 2.86½c. to 2.90½c.; No. 28, 2.96½c. to 3.00½c. Small lots from store sell at 10c. to 20c. above mill prices. Galvanized Sheets are selling fairly and the market remains steady at 75 and 5, Chicago, for mill shipment, and 75 and 2½ to 75 discount for shipment from local stocks.

**Cast Pipe.**—A very dull market has been experienced, there being few if any large contracts pending, aside from that at Minneapolis, which will not be decided for two weeks. A gas company at Indianapolis are making some inquiries, but have not purchased. Even the demand for Culvert Pipe from railroads has been light. Manufacturers continue to sell at the following prices, f.o.b. cars, Chicago, the outside quotations being for small lots: Four-inch, \$33 to \$34; 6-inch, \$32 to \$33; 8-inch, \$31.50 to \$32, and larger, \$31 to \$31.50, for Water, and \$1 per ton higher for Gas Pipe.

**Billets.**—An active and urgent demand, aggregating 50,000 tons, has continued to be experienced for Billets of all kinds, with sales of 3000 tons of Bessemer on the basis of \$30, and 3000 tons do. at \$31.50, Youngstown. Jobbing sales of Open Hearth Billets have continued to be made at prices ranging from \$34 to \$38, according to analysis, buyer and time of delivery. There has continued to be a good inquiry for foreign Steel, with sales of 3000 tons at \$32.75 to \$33.25, Chicago, according to size, for May, June and July shipment. There has also been an urgent inquiry for Wire Rods, with additional sales of 400 tons at \$37.50, for Chicago, for May and June shipment and 500 tons for July delivery.

**Merchant Pipe.**—The demand from local jobbers has continued light, but this falling off has been more than compensated for by increased orders both in quality and number from outside points and with the mills sold ahead from 30 to 60 days the market continues strong at full prices. The following is the official schedule of discounts for carload lots, Chicago, base, random lengths, mill shipment:

	Steel Pipe.		Guaranteed Wrought Iron.	
	Black.	Galvd.	Black.	Galvd.
Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
¼ to ¾ inch.....	66.35	56.35	63.35	53.35
¾ inch.....	68.35	58.35	65.35	55.35
¾ to 6 inches.....	73.35	63.35	70.35	60.35
7 to 12 inches.....	67.35	57.35	64.35	54.35

Less than carloads, 12½ per cent. advance.

**Boiler Tubes.**—There has been an increased tonnage placed by large interests and the market has remained firm in tone without change in prices, the following schedule of discounts for carload lots, Chicago, being current:

	Steel.	Iron.
1 to 1¼ inches.....	43.35	38.35
1¼ to 2¼ inches.....	55.85	35.85
2¼ to 5 inches.....	60.85	45.85
6 inches and larger.....	55.85	35.85

Less than carloads, 12½ per cent. advance.

Local jobbers have experienced a more active order trade, and the market has remained steady. The following are the discounts prevailing for shipment from local stocks:



	Steel.	Iron.
1 to 1½ inches.....	40	35
1½ to 2½ inches.....	50	32½
2½ to 5 inches.....	57½	42½
6 inches and larger.....	50	..

**Merchant Steel.**—Some little increase in the demand for Machinery, Tire and Spring Steel has been experienced during the week, and several additional fair sized contracts have been placed by agricultural implement manufacturers for the 1903-1904 season. There has continued to be a fair inquiry for Tool Steel, but competition is still keen. The following are the prices current at Chicago for mill shipment: Smooth Finished Machinery Steel, 2.01½c. to 2.11½c.; Smooth Finished Tire, 1.96½c. to 2.11½c.; Open Hearth Spring Steel, 2.66½c. to 2.76½c.; Toe Calk, 2.31½c. to 2.46½c.; Sleigh Shoe, 1.86½c. to 1.96½c.; Cutter Shoe, 2.41½c. to 2.61½c. Ordinary grades of Crucible Tool Steel are quoted at 6½c. to 8c. for mill shipment; Specials, 12c. upward. Cold Rolled Shafting in carload lots sells at 47 and in less than carload lots at 42 discount from list.

**Rails and Track Supplies.**—The situation has not changed essentially, there being a number of inquiries for Standard Sections, the aggregate tonnage being considerable, and business held in abeyance only by the inability of the mills to make satisfactory deliveries. Even so orders have been placed during the week for about 5000 tons of Standards and 6000 tons of Light Sections. Local interests are sold about 60 days ahead on Light Rails. The demand from second hands also continues active, and the market firm at full prices. Official quotations remain unchanged at \$28 for Standard and \$27 for second quality, mill shipment, Light Rails ranging in price from \$35 to \$40, according to weight. Track Supplies continue to sell well, and the market remains firm at the following prices, Chicago, for mill shipment: Splice or Angle Bars, 2c. to 2.25c.; Spikes, 2.10c. to 2.25c.; Track Bolts, 3¼ to 3½ inches and larger, with Square Nuts, 2.85c. to 3c.; with Hexagon Nuts, 3c. to 3.25c. From store 10c. to 15c. over mill prices are asked and obtained.

**Old Material.**—Dealers report a more ample supply of various grades, and the outlet to the mills being somewhat curtailed, the tone of the market is easier, especially for Railroad Wrought, Turnings and Borings, prices being from 25c. to 50c. per ton lower on these grades. There continues to be a good inquiry for Relaying Rails, which are scarce, and Old Car Wheels would sell readily, but very few are offered. The following are the prices per gross ton, Chicago:

Old Iron Rails.....	\$24.50 to \$24.75
Old Steel Rails, mixed lengths.....	18.50 to 19.00
Old Steel Rails, long lengths.....	22.00 to 22.25
Heavy Relaying Rails.....	31.50 to 32.00
Old Car Wheels.....	24.00 to 24.50
Heavy Melting Steel Scrap.....	18.50
Mixed Steel.....	16.00 to 16.50

The following quotations are per net ton:

Iron Fish Plates.....	\$21.50 to \$22.00
Iron Car Axles.....	24.50 to 25.00
Steel Car Axles.....	23.50 to 24.00
No. 1 Railroad Wrought.....	20.00 to 20.50
No. 2 Railroad Wrought.....	18.25 to 18.75
Shafting.....	20.00 to 21.00
No. 1 Dealers' Forge.....	16.50 to 17.00
No. 1 Bushing and Wrought Pipe.....	14.00 to 14.50
Iron Axle Turnings.....	14.50 to 15.00
Soft Steel Axle Turnings.....	14.50 to 14.75
Machine Shop Turnings.....	14.25 to 14.50
Cast Borings.....	9.50 to 10.00
Mixed Borings, &c.....	10.50 to 11.50
No. 1 Boilers, cut.....	14.50 to 15.00
Heavy Cast Scrap.....	17.50 to 18.00
Stove Plate and Light Cast Scrap.....	13.50 to 14.00
Railroad Malleable.....	16.50 to 17.00
Agricultural Malleable.....	15.50 to 16.00

**Metals.**—Copper has continued unusually quiet and still somewhat unsettled by speculative offerings. Regular dealers are not disposed to press offerings, anticipating a reaction after the absorption of the speculative material now on the market. Sales of Lake are being made in this market at 14½c. to 14¾c. in carload lots and 15c. in a jobbing way. Pig Lead has dropped 30c. per ton during the week, but quotations in this market are entirely nominal, very little, if any, selling being made from Chicago for the time being. Official prices are 4.30c. in 50 to 100 ton lots, and 4.32½c. to 4.35c. in carload lots. A stronger tone has been developed in Spelter, with an active demand and higher prices, sales at the close being made on the basis of 5.40c. in carload lots for Slabs. Sheet Zinc has also developed a stronger tone in sympathy with Slabs, sales being made at 6¾c., Chicago. Old Metals have sympathized with new material, both Copper and Lead being weaker and Zinc firmer. Heavy Cut Copper is selling at 12½c., Red Brass at 12½c., Copper Bottoms at 11¼c., Lead Pipe at 4.35c. and Zinc at 4.25c., spot.

**Coke.**—The market has been depressed by large offerings of poor qualities, high in sulphur, and the railroads pressing demurrage charges, very low prices have been made in some instances. Shipments are being made quite freely on contracts, and hence there is less demand in the open market. Virginia Furnace Coke is quotable at \$6.50 to \$7, and Connellsville at \$7 to \$7.50, single cars of Foundry Coke selling at 50c. per ton higher.

## Cleveland.

CLEVELAND, OHIO, April 28, 1903.

**Iron Ore.**—Following the charters made by the United States Steel Corporation last Monday of vessel tonnage on season contracts for the movement of Iron Ore down the lakes, the season contracting became almost general. The lake charters already reported show that all but two of the larger shippers have come into the market for their tonnage, and it is but a matter of a very short time until they will have covered their needs. The estimates made last week were that, counting the tonnage owned by the Ore shippers, which will carry about 12,000,000 tons of any bulk commodity during the year, there have been engagements amounting to 20,000,000 tons of Ore for the season. The peculiarity of these contracts is that they extend through the season, or to November 30, while all of the engagements heretofore have been limited to an earlier date, November 10 being generally the end of the contract season. The contracts terminate now with the insurance policies. Neither shippers nor vessel owners are making contracts so freely as a year ago. The Steel Corporation do not expect to move so much material as last year, and other shippers are disposed to depend more upon the wild rates. Many of the vesselmen are also convinced that the wild rates will be more profitable. The conflict of opinion bespeaks plenty of spice in the rate situation for the coming season of navigation, and the general expectation is that there will be no such rigid stability of rates as has been experienced for the past two years. With the beginning of lake shipment, which has been quite general this week, the dock shipments have almost stopped, as cars have been scarce even for the direct movement. The result is that delays to boats have been common and the receipts at the furnaces have fallen off. The shipment through Cleveland alone amounted to 56,000 tons.

**Pig Iron.**—The market this week shows but slight changes. In foundry the buying for immediate shipment has been as heavy as the supply will permit, and the furnaces of the Valleys are still making no offers for May and June delivery. These furnaces will be caught up with their orders by July 1, and will be able to afford a good run of material after that time. The supply from the outside furnaces is growing more and more limited, and the greatest difficulty is experienced in getting even moderate sized quantities for first half delivery. The buying for second half delivery is still held up. Quotations are \$22, f.o.b. Southern Ohio furnace for No. 2 for first half, and \$21 to \$21.50 for No. 2, Valley furnace, for second half delivery. In Basic Iron the market is quiet, both for the present and for future delivery. The furnaces in this territory seem to be entirely sold up for May and June, and have little if anything to offer. The sales are all of 100-ton or carload lots and are bringing \$21.50 to \$22 for first half. The sales for second half delivery have stopped. The buying period closed, after the product of several furnaces had been sold for six months ahead. The price is purely nominal, being \$20, Valley furnace, for second half delivery. In Bessemer nothing is being done for spot shipment, and there are not even inquiries for second half delivery. Nominal quotations are \$21.50 to \$22 for first half and \$20.50 to \$21 for second half delivery. The furnaces are getting plenty of Coke, and have been producing at the normal rate of speed for the past few weeks. Deliveries are now accomplished with greater ease than usual.

**Finished Iron and Steel.**—For the past few weeks the Structural market has been unsteady and weakness was constantly reported, but during the week just closed the situation grew much stronger. No big orders have been placed, but the contractors being convinced that they can get material have started many new projects. Inquiries therefore have been heavy. Premiums on Shapes of 10 inches and over have disappeared altogether, because many of the larger mills in the Pittsburgh district are able to make deliveries in 30 days. On Shapes 6 or 8 inches and less deliveries are more backward, but are made within two months. This is practically depriving the market of any premium business and the smaller mills are quoting the standard prices. The jobbers are reporting a firmer market. Quotations are 1.60c., Pittsburgh, from the mills, and 2.15c. to 2.25c. out of stock. In Plates nothing has been done by the larger mills, while the smaller ones are taking some business at a slightly reduced price, the market easing off some. The quotations are 1.60c., Pittsburgh, from the larger mills and 2c., Cleveland, from the smaller concerns. The Sheet market is much stronger than it was. Business has been steady and the demand good. There is nothing yet like a congestion of the mills with orders, and some even might feel more comfortable if they had more business contracted ahead, but even at that there is no weakness, neither is there any inclination to force an advanced price on the general market. The quotations, therefore, remain: 3.10c. to 3.25c. for No. 27 Black Sheets out of stock, the same gauge bringing 1.85c. to 1.95c. at the smaller mills. In Bars the situation is practically unchanged, with reference both to the Steel and the Iron products. Some

few of the smaller agricultural implement works have purchased their supply of material for the coming year, but the larger buyers are still holding off. It seems that there is a general feeling among the consumers that no further change in prices need be expected, which accounts for the buying of the smaller concerns, and the same action on the part of the larger buyers is expected this week. Some have even made verbal contracts, but have not reduced them to writing. One order of about 3000 tons is reported. The Bar Iron product is not very active, said to be due in part to the desire of the producers to quit making it. Both the Iron and the Steel markets have held firm. The prices quoted are: Bessemer Steel Bars, 1.60c., Pittsburgh; Open Hearth, 1.70c., Pittsburgh; Bar Iron, 1.85c., Youngstown. The Rail trade has presented a number of inquiries to the mills, the electric railroads having most to do with the new construction. The mills are in no position to take on any new business, hence no sales have been reported. Prices are \$28 for Standard and \$36 for Light Rails.

**Old Material.**—There is a good call for Steel Scrap and a scant supply of it. Otherwise the market is steady but quiet, the aggregate business being good, but individual orders small. Prices remain as follows: No. 1 Wrought, \$19.50, net; Cast Borings, \$12, gross; Car Wheels, \$22.50, gross; Heavy Steel, \$21, gross; Iron Rails, \$25.50, gross; Iron Axles, \$27.50, net; Wrought Turnings, \$14.50, net; Old Steel Rails, \$21, gross.

## Cincinnati.

FIFTH AND MAIN STS., April 29, 1903.—(By Telegraph.)

As far as actual business transacted in the Pig Iron market in this district throughout the past week goes, there is but very little to say about it, except to duplicate what has been told over so many times, that "last week was the duldest week we have had in months." The association furnaces are, as far as reported, holding very conscientiously to the agreed schedule, while the outside furnaces are taking matters in their own hands and selling, or endeavoring to sell, on a basis of \$1 lower than the association schedule. This makes the business that is being done on the basis of \$16.50, Birmingham, for No. 2 Foundry. One of the prime causes for this cut is regarded to be the Eastern differential of \$1, which after it was published came to the knowledge of Western buyers, and has created such a storm of protest that the furnaces who have felt a little weak have taken this opportunity for making the concession in the West. The only considerable sale which is noted in Ohio of Foundry Iron was made in a central Ohio city on the basis of \$16.50. The Iron sold was No. 2 Soft and Foundry. As far as Gray Forge and kindred lines are concerned the understanding is that quite a lot of Iron has been sold on the basis of \$14.75, Birmingham, and this figure is commonly regarded as the present selling basis for that brand. Of course, buyers are still holding off, and while sellers are confident that they will come into the market at no very distant future, yet the outlook both as to buying and as to selling basis looks extremely doubtful. The general feeling is that there is nothing in sight to cause a further decline within the next week, but a feeling of uncertainty certainly exists as to how much further the decline is going later on. Freight rates from the Hanging Rock district, \$1.15, and from Birmingham to Ohio River points \$3.25. We quote, f.o.b. Cincinnati, for delivery throughout the year, as follows:

Southern Coke, No. 1.....	\$20.25 to \$21.25
Southern Coke, No. 2.....	19.75 to 20.75
Southern Coke, No. 3.....	19.25 to 20.25
Southern Coke, No. 4.....	18.75 to 19.75
Southern Coke, No. 1 Soft.....	20.25 to 21.25
Southern Coke, No. 2 Soft.....	19.75 to 20.75
Southern Coke, Gray Forge.....	17.00 to 19.50
Southern Coke, Mottled.....	17.00 to 19.50
Ohio Silvery, No. 1.....	29.15 to 30.15
Lake Superior Coke, No. 1.....	23.15 to 24.15
Lake Superior Coke, No. 2.....	22.15 to 23.15
Lake Superior Coke, No. 3.....	21.15 to 22.15

### Car Wheel and Malleable Irons.

Standard Southern Car Wheel.....	\$28.25 to \$29.25
Lake Superior Car Wheel and Malleable.	27.50 to 28.50

**Plates and Bars.**—The market is rather quiet on an unchanged basis. We quote, f.o.b. Cincinnati, as follows: Iron Bars in carload lots, 1.92c., with half extras; same, in small lots, 2.20c., with full extras; Steel Bars, carload lots, 1.73c., with half extras; same, in small lots, 2.20c., with full extras; Plates, ¼-inch, in carload lots, are still nominal 1.70c.; 3-16 inch, 1.80c.; Beams and Channels, 1.70c., base.

**Old Material.**—Market very quiet, though steady. We quote dealers' buying prices as follows, f.o.b. Cincinnati: No. 2 Wrought Railroad Scrap, \$20.50 per net ton; Cast Scrap, \$17.50 per net ton; Iron Rails, \$23 per gross ton; Long Steel Rails, \$22.50 per gross ton; Short Steel Rails, \$18 per

gross ton; Iron Axles, \$27.50 per net ton; Car Wheels, \$24 per gross ton; Low Phosphorus Steel, \$25 per gross ton; Heavy Melting Steel, \$20 per gross ton.

## St. Louis.

CHEMICAL BUILDING, April 29, 1903.—(By Telegraph.)

**Pig Iron.**—The Pig Iron market seems to be without noticeable features the past week and is very quiet, enlivened only slightly by a continuance of the scattering buying of small lots for immediate shipments. While the largest Southern interests are holding to the basis of \$17.50, Birmingham, for No. 2 Foundry, we are informed that some other furnaces are offering the same grades in this market at \$1 under these prices. The situation is a waiting one, buyers are evidencing any overanxiety to cover future requirements. We quote, f.o.b. St. Louis, as follows:

Southern, No. 1 Foundry.....	\$20.75 to \$21.75
Southern, No. 2 Foundry.....	20.25 to 21.25
Southern, No. 3 Foundry.....	19.75 to 20.75
Southern, No. 4 Foundry.....	19.25 to 20.25
No. 1 Soft.....	20.75 to 21.75
No. 2 Soft.....	20.25 to 21.25
Gray Forge.....	18.75 to 19.75
Southern Car Wheel.....	28.50 to 29.75
Malleable Bessemer.....	25.00 to 25.75
Ohio Silvery, 8 per cent. Silicon.....	32.50 to 33.00
Ohio Strong Softeners, No. 1.....	.... to ....
Ohio Strong Softeners, No. 2.....	.... to ....

**Bars.**—The jobbing trade in both Iron and Steel Bars continues in very fair volume, with trade about evenly divided between local and outside sources. Prices are firm at the former level. We quote from the mills: Iron Bars at 1.85c. to 1.90c., Steel Bars at 1.82½c. to 1.90c., half extras. Jobbers continue to quote 2.15c. in round lots and 10c. higher for small quantities for both Iron and Steel.

**Rails and Track Supplies.**—There seems to be no cessation of activity in the demand and inquiry for Rails and Track Supplies. Liberal plans for railroad extension are coming up continually and the outlook is for an extended term of the pressure for supplies. Prices are firm on basis as follows: Splice Bars at 2.05c. to 2.25c.; Bolts, with Hexagon Nuts, 3.05c. to 3.25c.; with Square Nuts, 2.90c. to 3.05c.; Spikes, 2.25c. to 2.30c. Jobbers' prices are generally about 10c. to 15c. higher than the above quotations.

**Angles and Channels.**—The demand and inquiry for Small Angles and Channels continues steady and the aggregate volume is of fair proportion. Jobbers' quotations are firm for this class of materials and they quote 2.25c. to 2.40c. in lots from store.

**Pig Lead.**—The Lead market has shown rather unsettled conditions the past week, buyers standing aside with the expectation of lower prices. Offerings of Missouri brands as low as 4.25c. do not, at this time, seem attractive, and it is said that this figure has been shaded in some instances. The generally prevailing quotation at this time is 4.25c.

**Spelter.**—Spelter shows marked steadiness, with a very fair volume of transactions. The offerings are not very liberal and price holds firm at 5.50c.

## Pittsburgh.

(By Telegraph.)

PARK BUILDING, April 29, 1903.

**Pig Iron.**—Considerable Bessemer Pig Iron has moved in the past week, and we note sales of 35,000 to 40,000 tons for delivery in third quarter and last half of this year. Prices have declined to some extent, and Bessemer Iron for shipment in third quarter has sold at \$19.50 to \$19.65, at Valley furnace, while for shipment over the last six months \$19 has been done on several round lots. There is some inquiry for Basic Iron, which is held at \$19.50 to \$20, at maker's furnace. Forge Iron is quiet, Northern brands being held at about \$20.25, while Southern Forge was offered at \$19.85, Pittsburgh. We note a sale of 500 tons of Southern Forge at this price. Foundry Iron is somewhat quiet, Northern No. 2, for prompt shipment, being held at \$21.50, and for extended delivery probably a little lower price would be done. Southern No. 2 Foundry is \$16.50, Birmingham, or \$21.35, Pittsburgh.

**Steel.**—Steel continues scarce and as the demand is active prices are high and very firm. Bessemer Billets are held at \$30.50 to \$31, and Open Hearth \$31 to \$31.50, maker's mill. We note a sale of 1000 tons of 4-inch Bessemer Billets at \$30.25, maker's mill.



(By Mail.)

With the settlement of the Iron workers' strike last week labor matters in the Pittsburgh district are in a very satisfactory condition and it is believed May 1 will pass without any serious disturbances. While it is understood that the Amalgamated Association, which has been in convention at Columbus, Ohio, for several weeks, have recommended some slight advances in the wage scales in Sheet and Tin Plate mills, these are not thought to be sufficient to cause any trouble in fixing up the wage scales for the coming year. Labor is now being paid much higher wages in many lines than ever before, and while arbitrary methods have been employed in the past, it is thought that with the high wages the men are receiving the danger of any serious labor disturbances has been reduced to a minimum. It is probable that blast furnace labor will ask an advance in wages after May 1, but this will likely be arranged on a basis satisfactory to both sides. While conditions in the Iron market are somewhat quiet, the situation is in the main satisfactory. There was a larger movement in Pig Iron last week than for some time, but prices were on a slightly lower basis. Demand for Steel continue large and with the scarcity in supply high prices are ruling. There is a heavy demand for Plates and Structural Steel, while Sheets and Pipe are also in good request. There have been no important changes in prices since our last report.

**Structural Material.**—The Iron workers' strike was settled last week on terms satisfactory to the American Bridge Company and their men, concessions having been made by both sides. A good deal of tonnage is under negotiation and a recent contract taken by the McClintic-Marshall Construction Company was for Steel buildings for the Ford City Foundry at Kittanning, about 600 tons. Deliveries are now very satisfactory, the mills having caught up pretty well on contracts. We quote: Beams and Channels up to 15-inch, 1.60c.; over 15-inch, 1.70c.; Angles, 3 x 2 up to 6 x 6, 1.60c.; Zees, 1.60c.; Tees, 1.60c.; Steel Bars, 1.60c., half extras, at mill; Universal and Sheared Plates, 1.60c. to 1.70c.

**Plates.**—While demand for Plates is perhaps not quite as heavy as some time ago, yet it is sufficiently large to give the mills full work. In fact, some of the larger Plate mills are sold up full for the next three or four months or longer. Parties who want prompt deliveries of Plates still have to pay slight premiums over regular prices. Official prices are as follows: Tank Plate, 1/4-inch thick and up to 100 inches in width, 1.60c., at mill, Pittsburgh; Flange and Boiler Steel, 1.70c.; Marine, Ordinary Fire Box, American Boiler Manufacturers' Association specifications, 1.80c.; Still Bottom Steel, 1.90c.; Locomotive Fire Box, not less than 2.10c., and it ranges in price up to 3c. Plates more than 100 inches wide, 5c. extra per 100 lbs. Plates 3-16 inch in thickness, \$2 extra; gauges Nos. 7 and 8, \$3 extra; No. 9, \$5 extra. These quotations are based on carload lots, with 5c. extra for less than carload lots; terms net cash in 30 days.

**Spelter.**—The market is somewhat quiet, but prices are firm. We quote prime grades of Western Spelter at 5.48 1/2c. for futures and 5.53 1/2c. for prompt delivery, f.o.b. Pittsburgh.

**Iron and Steel Bars.**—Several fair sized contracts for Steel Bars have been placed by agricultural implement makers in the past week, and general demand is slightly improved. However, tonnage is not as large as the mills would desire. Specifications on contracts are coming in at a little better rate. Demand for Iron Bars is good, and prices are reasonably firm. We quote: Iron Bars at 1.85c. to 1.90c., Pittsburgh, in carload lots and 1.95c. in small lots, half extras, as per National card. We quote Steel Bars at 1.60c., at mill. All specifications for less than 2000 lbs. of a size subject to the following differential extras: Quantities less than 2000 lbs., but not less than 1000 lbs., 0.10c. per lb. extra. Quantities less than 1000 lbs., 0.30c. per lb. extra, the total weight of a size to determine the extra regardless of length.

**Steel Rails.**—As intimated last week would be the case, the Ohio works of the Carnegie Steel Company, at Youngstown, has been switched over from Rails to Billets. This takes about 1500 to 1800 tons of Rails a day out of the market. As soon as the pressure for Steel has been relieved, this plant will go back on Rails again. Some inquiries are in the market for 1904 delivery, but as yet nothing has been done. The order for 40,000 tons for the Canadian Pacific Railroad has not yet been closed, but will probably go to a foreign mill. We quote at \$28, at mill, for Standard Sections, in 500-ton lots and over.

**Muck Bar.**—The market is somewhat quiet, and we quote best grades of domestic Muck Bar at \$35, f.o.b. Pittsburgh.

**Spikes.**—There is a good demand for Spikes, and the mills are filled up for several months. We quote Boat and Railroad Spikes at \$2.25 per 100 lbs., f.o.b. Pittsburgh.

**Rods.**—There is considerable scarcity in supply of Rods, and the market is very firm. We quote Bessemer Rods at

\$37 to \$37.50, and Open Hearth, ordinary carbons, at \$38 to \$38.50, f.o.b. Pittsburgh.

**Sheets.**—A report that the leading interest had made an advance in price of Galvanized Sheets is not confirmed. However, the tone of the Sheet market is exceedingly strong and a general advance in prices of both Black and Galvanized before long is generally expected by the trade. Demand is good and the mills have more tonnage on their books than for some time. We quote Black Sheets as follows: Nos. 22 and 24, Box Annealed, one pass through cold rolls, 2.45c.; No. 26, 2.55c.; No. 27, 2.65c. to 2.75c., and No. 28, 2.75c. to 2.85c. Some of the outside mills, we are advised, are quoting slightly higher prices than these. Galvanized Sheets are very firm and some mills are quoting on the basis of 75 and 5 off, which for No. 27 is equal to 3.80c., and for No. 28, 4.04c. A few mills continue to quote in large lots at 75 and 7 1/2 to 75 and 10 off. The lower price, however, is exceptional and is made by only a few mills and on very attractive orders. For small lots jobbers charge the usual advances.

**Merchant Steel.**—A moderate amount of tonnage is being placed and several good sized contracts for Agricultural Steel have been placed in the past week. Demand for Shafting is only fair, but fixed prices are being rigidly held. We quote: Tire Steel, 1.80c. to 1.90c.; Open Hearth Steel, ordinary grades, 1.70c. to 1.80c.; Open Hearth Spring, 2.25c. to 2.35c.; Cant Hook Steel, 2.50c.; Plow Slabs, Bessemer, 2.50c.; Plow Slabs, Open Hearth, 3.75c.; Tool Steel, ordinary grades, 6 1/2c. and upward; Cold Rolled Shafting, 42 per cent. off in less than carloads, and 47 per cent. in carloads, delivered in base territory.

**Hoops and Bands.**—There is very little doing in Cotton Ties, but tonnage in Hoops and Bands is fair. We quote Cotton Ties at 88c. in 5000-bundle lots and over, and 91c. for less quantities. Steel Hoops are 1.90c. on 200-ton lots and over, and 2c. in less quantities. Bessemer Bands are 1.60c. up to No. 12 gauge, and Open Hearth 1.70c., extras as per Steel card. These prices are f.o.b. makers' mill.

**Skelp.**—Steel Skelp is exceedingly hard to get on account of the scarcity of Billets and prices are high. We quote Grooved Iron and Steel Skelp at 2.05c. to 2.10c., but note that the higher price is being obtained for reasonably prompt shipment. Sheared Iron and Steel Skelp is 2.10c. to 2.15c., f.o.b. Pittsburgh, or 2 per cent. off for cash in 10 days.

**Tin Plate.**—Demand continues heavy and it is intimated that the leading interest may make a further advance in prices about May 1. We quote Cokes 14 x 20 at \$3.90 to \$4 a box, f.o.b. Pittsburgh. Good sized contracts are being placed with the mills at the higher price.

**Pipes and Tubes.**—The Pipe market is very firm as regards prices, but tonnage is not as large as some time ago. Demand has probably been interfered with more or less by the labor troubles at some of the large centers. Steel Pipe is hard to get for prompt shipment, on account of scarcity of Steel Skelp. Prices are firm and discounts to consumers in carload lots are as follows:

	Merchant Pipe.		Wrought Iron.	
	Black.	Galv.	Black.	Galv.
	Per cent.	Per cent.	Per cent.	Per cent.
1/2, 3/4 and 1 inch.....	68	58	65	55
1 1/2 inch.....	70	60	67	57
2 to 6 inches.....	75	65	72	62
7 to 12 inches.....	69	59	66	56
Plugged and Reamed:				
1 to 4 inches.....	73	63	70	60
Cut 3 to 6 feet:				
1/2, 3/4 and 1 inch.....	63	52	60	49
1 1/2 inch.....	65	54	62	51
2 to 6 inches.....	71	60	68	57
7 to 12 inches.....	65	53	61	50
Cut 6 feet and longer:				
1/2, 3/4 and 1 inch.....	64	53	61	50
1 1/2 inch.....	66	55	63	52
2 to 6 inches.....	72	61	69	58
7 to 12 inches.....	66	54	62	51
Extra Strong Plain End:				
1/2 to 8 inches.....	67	57	63	53
Threads only.....	66	56	62	52
Threads and Couplings.....	65	55	61	51
Double Extra Strong Plain End:				
1/2 to 8 inches.....	59	49	55	45
Threads only.....	58	48	54	44
Threads and Couplings.....	57	47	53	43

NOTE.—Orders for less than carload will be charged at 12 1/2 per cent. advance. Extra and Double Extra Strong Cut Lengths, lower random discounts by 10 per cent. net for 6 feet and longer, and 15 per cent. net for 3 to 6 feet. We may note, however, that on Iron Pipe some of the outside mills are naming slightly lower discounts.

**Coke.**—Supply of Coke at the present time seems to be in excess of demand and prices are weak. Output in the upper Connellsville region last week was 249,025 tons and in the lower region about 52,000 tons, or slightly over 300,000 tons for both regions. There is now a full supply of cars and consumers have no difficulty in getting Coke as fast as needed; in fact, a number of furnaces have been getting Coke in larger quantities than they could take care of and

some Furnace Coke has been offered for resale. We quote Furnace Coke for prompt shipment at \$4 to \$4.50 and Foundry at \$5.50 to \$6 a ton. There is nothing doing in regard to contracts for Furnace Coke for last half, buyers holding off believing that prices will be lower.

## Birmingham.

BIRMINGHAM, ALA., April 27, 1903.

It is a hard matter to determine the market value of Iron. There is no doubt of irregularity in prices, but just what influence predominates is the question. Several large interests have been in the field, one taking 10,000 tons, one taking 7500 tons and one taking 2500 tons, and all covered by the associated blanket labeled association prices. But there have been buyers right on their heels who have succeeded in shading prices, and yet to what extent they refuse to state. There can be no doubt as to the fact that prices established by the association are not adhered to, but every concession in price is carefully guarded, and billing figures are carefully guarded also. It requires a good deal of credulity to believe that association prices are being maintained, while it is equally as difficult to definitely note the decline in prices. But one would not be out of the way who quoted the market on the basis of \$16.50 for No. 2 Foundry Iron. The line separating sections as to prices must disappear. Past experience has been against it and present experience denotes its hostility. It won't stand. All buyers will pay the same price. The buyers that entered the market have been content to buy for prompt and nearby delivery, and leave the second half of the year open to possibilities. At the same time it must be admitted that buyers are uneasy and hesitate at the boundary line separating the second half from the first half of the year. They have contracts based on prices of raw material at higher values than now prevail and yet are afraid to close with producers at existing prices of raw material. The situation shows only an unsettled feeling whose culmination the future will disclose.

To epitomize the situation is to express it as unsettled, with the bulk of transactions at inside figures. It isn't a pleasant review of the market, but as near truthful as existing conditions warrant. Some interests are upholding prices and refusing concessions from published rates, but there are a number doing so sufficient to influence quotations and to make the market wabby. It is therefore impossible to quote it otherwise than irregular and prices hard to give with certainty. The names of a few leading buyers are mentioned as having entered the market, but their purchases have been restricted in volume and in delivery limited to the first half of the year. With a considerable influential element there is an admission that for the last half of the year they are running the chances as to prices and will let that delivery take care of itself. In some circles the feeling is dominant that all the Iron that can be commanded for the market will be needed, and this element is chary about concessions. But there are makers of Iron who believe it unwise to refuse a fair profit, and these are the ones who are meeting buyers' views at the half way notch of difference. As we approach the second half of the year old business will be cleaned up fairly well and there will be a free field for the offering business. That part of it seems assured. The price of Iron seems to be the only thing in dispute. Holders have in their favor the fact that the buyers will come into the market with no stock to back them and be at that disadvantage. All that can be said is the battle is joined and the skirmish lines are engaged, but results are yet to be recorded.

The committee appointed by the Tennessee Company to inspect their property has been here and gone over the property. As a rule the best foot is put out for inspection to these committees, but in this particular case one would have to be blind not to notice the great advances made by the present management toward putting the property on the basis of a dividend payer. Large sums have been expended with this end in view and results are unfolding to view the wisdom of the course that has been pursued. The Coal and Coke output is increasing, and everything as to output has so favorable an outlook that one is justified in saying that by midsummer our difficulties will be surmounted and "we will sleep and board at home."

The Lacey-Buek Company, controlling the Trussville Furnace, purchased during the past week about 2500 acres of Coal land situated on or near the Warrior River as a matter of precaution. They did not need it, but the accession of this property placed them in a position of independence and largely protected their proprietary interests. Another tract of Coal property adjoining this tract is under treaty and its sale may be announced at any time. There are other deals in process of conclusion that we might with safety characterize as closed, but they yet officially stand as still in waiting.

A few corporations of ability manifest life, but the full fruition of events has not yet been demonstrated. Everything indicates an increasing interest in affairs here. We are still on the upward trend.

## German Iron Market.

ESSEN, April 11, 1903.

Since our last report the improvement in the German Iron and Steel markets has progressed further. The strong inquiry from foreign countries, which, it is true, is confined chiefly to raw and half finished products, continues, and at last the home market too has begun to be more active. Still, in spite of the appearance of a greater demand for our own country confidence is not yet very vigorous. It is only in a few branches that it has been possible to raise prices for the home market, and these bring profit only to a few exceptionally well equipped works which have their own raw material. Those plants which are not entirely up to standard in equipment and those which must rely upon the open market for Pig Iron and Steel are still working without a profit.

The prices for export shipments, which still amount to about one-half of the entire production of Iron, have become stronger lately and are now not very far below those of the home market. The exact prices as to export contracts are impossible to obtain because these prices are strictly guarded by the mills. The reason for this is not difficult to understand. If the German consumers of Pig Iron, Steel, &c., were able to secure authentic information as to cheap export sales on the part of works who are syndicated for the home market, but take export orders at any prices they care to make the consumers would naturally complain to the Government and ask for intervention against the syndicates. This is being done even now, but the complaints are only general in their character, and nothing absolutely certain is known as to export prices. These prices are not due to a particular love of the mills for low quotations, but were the outgrowth of sharp competition on the world's markets, and, as already stated, they are said to be very much closer to the home market prices at this time. Thus we know of one large Billet sale at 92 marks, f.o.b. Rotterdam, when not long ago 80 marks and below is said to have been done.

So far as the different branches are concerned it may be remarked that the Siegen Iron Ore mines are again in full operation and are selling at unchanged prices. Nor has there been any change in the figures for Minette or Spanish and Swedish Ores. During the last few weeks several larger lots of South Russia Iron Ore have been sold for delivery in Germany. They are to go via Black Sea ports to us.

The Pig Iron market continues active and deliveries are going forward at a rapid rate. Some large sales have been made for the third quarter so that the furnaces are fully employed. The active demand from America has continued and larger sales have been effected at better prices. Pig Iron prices at the present time are 67 marks for 10 to 12 per cent. Spiegeleisen, 57 marks for Thomas Pig, delivered at Steel plant; 67 marks for Bessemer Pig, 45 marks for Luxemburg Mill Iron, 52 marks for No. 3 Luxemburg Foundry Iron, 66.50 for No. 1 and 64.50 for No. 3 German Foundry Iron, all f.o.b. furnace. English No. 3 Foundry is quoted 70 marks, delivered Ruhrort.

For Steel large contracts have been closed both for the home market and for export into the third quarter, better prices having been secured for the export sales. It is doubtful whether any Steel can now be purchased for delivery up to July 1. Official prices remain unchanged at 77.50 marks for Thomas Ingots and Heavy Blooms, 82.50 marks for Blooms and Heavy Billets, 90 marks for Ordinary Billet, 92.50 marks for Slabs, with about 5 marks additional for Open Hearth quality.

There is continued active demand for Scrap at rising prices, and therefore the export has rapidly declined. Heavy Cast Scrap is quoted 57 to 58 marks; Melting Stock, 46 to 47 marks; Old Iron Rails, 77 to 78 marks, f.o.b. consumers' works.

The Bar Iron market is still suffering from the great decline in prices in December of the last year. At that time a number of the large mills sold considerable quantities to the large dealers at 98 to 100 marks, and naturally the dealers are trying to market the tonnage and with continued light demand in our home market this is possible only at a very slight profit. The result is that the competition between the dealers and the rolling mills is very sharp. Those works which must buy raw material cannot work at a profit under these circumstances, and their position would be a very serious one if the export sales did not continue on a large scale, although at pretty low prices. For the third quarter fair contracts are now being made and conditions are somewhat better. Steel Bars are quoted 110 to 112 marks; Iron Bars, 120 marks; Rivet Iron, 130 marks; Bands for the home market, 125 to 127.50 marks, with a light demand. There is a relatively active inquiry from abroad.

The Skelp business has become livelier, but prices have not yet been advanced. Boiler Tube Skelp is quoted 118 to 121 marks; Iron Gas Pipe Skelp, 125 to 128 marks. Steel Boiler Tube Skelp, first quality, 155 marks; second quality, 145 marks. The demand for Pipe and Tubes has increased



somewhat and in the case of Beams also more work is coming in as the building season opens. In addition to this there is quite a notable export movement. The amount of work coming to the Plate mills is unsatisfactory throughout, and it is necessary to keep on taking cheap export orders in order to keep the mills busy. The Sheet market is livelier both at home and abroad, and better figures have been secured for export lately. There is an active demand for Wire Rods, and the export prices, too, have improved. Ordinary Wire Rods are quoted 105 to 110 marks, f.o.b. Ruhrort, according to quantity. The Rail mills are employed to an extraordinary extent, and more inquiries are coming in for export than can be taken care of. Prices are improving and it is possible to count upon at least 90 marks per ton, f.o.b. mill, on export orders.

## New York.

NEW YORK, April 29, 1903.

**Pig Iron.**—Founders in this district are doing very little and the market is very quiet. Quite a sharp demand has developed again for Basic Pig and one transaction for 10,000 tons between two Eastern Pennsylvania interests has been closed. Some additional small lots have been placed. The contract for the product of a Lake Champlain furnace has been renewed. We quote, at tidewater, for prompt to early delivery: Northern Iron, No. 1, \$22 to \$22.50; No. 2, \$20.50 to \$21; No. 2 Plain, \$20 to \$20.50. Tennessee and Alabama brands in New York and vicinity: No. 1, \$21.50 to \$22; No. 2, \$20.50 to \$21; No. 3 Foundry, \$19.75 to \$20.

**Steel Rails.**—The week has been uneventful in Steel Rails, although a fair run of small orders continues. Some foreign Rails, Light Sections, are selling at New Orleans. At least one of the domestic mills is watching the Canadian and Pacific Coast markets closely and is making prices to secure the business. We continue to quote \$28 for Standard Sections at Eastern mill.

**Cast Iron Pipe.**—Quite a number of large purchases of Pipe, which had been expected to be ready for letting by this time, have been postponed for some reason, and at the moment no important tonnage is in sight. Nevertheless the demand for moderate quantities of small sized Pipe continues up to the volume noted for some time, and the trade is therefore in excellent condition. Prices are firmly held on carload lots, which are quoted at \$36.50, gross ton, at tidewater, for 6 and 8 inch, and \$35.50 for 12-inch upward.

**Finished Iron and Steel.**—The American Bridge Company have closed several fair sized contracts during the week, with a very heavy tonnage still under negotiation. Among the orders just entered were the following: Maine Central, 2500 tons; Wabash, 2500 tons; Chicago & Northwestern, season contract, 2300 tons, and the Oliver Building, Pittsburgh, 2000 tons. In this immediate locality the demand for Structural Material is quiet, which is undoubtedly due to dissatisfaction with labor conditions. The American Bridge Company have effected a settlement with their employees, and operations have been resumed on all work on which labor troubles had checked progress. The Plate trade is fairly active, with some good sized orders placed and under negotiation. The demand for Plate for riveted Pipe has been quite a feature. Sales have been made of 2700 tons to a New Jersey company, and 900 tons for the Pacific Coast, to be used for this purpose. The local labor troubles are causing the usual run of small orders from consumers in New York and vicinity to be held back until the wage adjustment for the year is made, which it is hoped will be done this week. Prices are somewhat firmer, the Eastern mills now being able to get a slight advance on recent quotations, which is partly due to their ability to make better deliveries than their Western competitors. The Bar Iron situation has recently been slightly disturbed by mills outside of the association who have been shading prices. Although they have a limited output, the steadiness of the market was seriously threatened. Indications now favor more harmonious relations. A meeting of the Eastern Bar Iron Association will be held this week. We quote, at tidewater, as follows: Beams, Channels and Zees, 1.75c. to 2c.; Angles, 1.75c. to 2c.; Tees, 1.80c. to 2c.; Bulb Angles and Deck Beams, 1.90c. to 2.25c. Sheared Steel Plates, in carload lots, are 2c. for Tank, 2.10c. for Flange, 2.20c. for Marine and 2.35c. upward for Fire Box. Refined Bars are 1.95c. to 2c.; Soft Steel Bars, 1.75c. to 1.90c.

**Old Material.**—Rolling mill stock is stagnant. Dealers, however, expect a better demand to result from the establishment of greater harmony among Eastern Bar Iron manufacturers, which will enable them to maintain prices. Mill owners can then feel more confidence in the future and will, it is expected, be more likely to take in stock. Steel Melting Scrap continues strong, owing to the heavy demand for Steel Billets. Cast Scrap is lower, in sympathy with the feeling in Pig Iron circles. Old Car Wheels continue to decline. Old Iron Rails continue very scarce and quotations are only nominal. The high price of Old Iron Axles is diverting some

trade to Steel Billets. We quote, f.o.b. cars, vicinity New York, per gross ton, as follows:

Old Iron Rails.....	\$24.50 to \$25.00
Old Steel Rails, long lengths.....	22.00 to 22.25
Old Steel Rails, short pieces.....	19.25 to 19.50
Relaying Rails, heavy sections.....	26.00 to 27.00
Relaying Rails, lighter sections.....	26.00 to 27.00
Old Car Wheels.....	22.50 to 23.00
Old Iron Axles.....	30.50 to 31.00
Old Steel Car Axles.....	25.50 to 26.50
Heavy Melting Steel Scrap.....	19.25 to 19.50
No. 1 Railroad Wrought Scrap Iron.....	22.50 to 23.50
Iron Track Scrap.....	19.50 to 20.50
Wrought Pipe.....	15.50 to 16.00
Ordinary Light Iron.....	11.00 to 12.00
No. 1 Machinery Cast Scrap.....	18.00 to 19.00
Stove Plate.....	13.50 to 14.00
Wrought Turnings, delivered at Mill.....	17.00 to 17.50
Cast Borings, delivered at mill.....	11.50 to 12.00

The American Iron & Steel Mfg. Company of Lebanon, Pa., manufacturers of Bar Iron, Bolts, Nuts and Rivets, will open a sales office in New York next week.

The New York office of the Lukens Iron & Steel Company, W. H. Edgerley, sales agent, has been removed to rooms 1515, 1516 and 1517 New Whitehall Building, 17 Battery place.

The New York office of the Joseph Joseph & Brothers Company, Leonard Joseph, manager, dealers in Old Material, has been removed to the American Security Company's building, 100 Broadway.

## Metal Market.

NEW YORK, April 29, 1903.

**Pig Tin.**—The market has been very quiet throughout the week. No increase in buying movement is to be noted and little interest is shown generally. Notwithstanding the absence of activity in buying for consumptive account prices have been forced upward a little more, both here and in London. This market closed with quotations for spot to May at 30.05c. to 30.12½c., and May at 30.10c. to 30.15c. London advanced to £137 5s. for spot and £136 15s. futures. The arrivals for the month amount to 3030 tons and the afloats aggregate 3664 tons.

**Copper.**—The market has been very weak. Prices have declined considerably and to-day have experienced a natural reaction. The net result for the week, however, is a decline from last week's prices. This is the case even in the instance of the prices which the large producers allow the Metal Exchange to publish. The quotations of the 'Change to-day were 14¾c. to 15c. for Lake and Electrolytic, and 14½c. to 14¾c. for Casting. Outside offers to sell as low as 14¼c. on any brand have failed to bring out buyers. The London market also experienced a decline and reaction. Prices there went as low as £59 7s. 6d., but closed to-day £60 15s. for both spot and futures. Best Selected declined to £64, but closed to-day £65 10s. Exports for the month to date amount to 11,747 tons, against 14,837 tons of last year.

**Pig Lead.**—The American Smelting & Refining Company reduced the price 30 points. They now quote on a basis of 4.37½c. for carload lots of Desilverized, New York delivery. The reduction was made on Saturday last. St. Louis is 4.25c. London declined sharply to £11 17s. 6d.

**Spelter.**—The market has been quiet, though prices have advanced slightly to 5.75c. for spot. St. Louis has advanced to 5.50c., and London has advanced 5 shillings, to £22 15s.

**Antimony.**—Cookson's has declined to 7¾c. to 8c; Hall's is unchanged at 7c., and other brands, 6.75c.

**Nickel.**—No change is noted. Large quantities down to ton lots are now quoted at 40c. to 47c. per lb., according to size and terms of order. Smaller lots are quoted as high as 60c., according to quantity.

**Quicksilver.**—Has advanced to \$47.50 per flask of 76½ lbs. in lots of 50 flasks or more. London is unchanged at £8 12s. 6d.

**Tin Plate.**—There is no change. Business is fair. The price of the American Tin Plate Company is based on \$3.80 per box of 14 x 20 100-lb. Cokes, f.o.b. mill, and \$3.99 New York delivery.

Guayaquil, Ecuador, a city of 60,000 people and said to be one of the most unhealthy cities in the world, is to be renovated and rendered sanitary. Senor Garcia, president of one of the banks in that city, is in New York for the purpose of receiving and acting on bids for the construction of a complete system of sewers and water supply. The cost of the sanitary improvements is estimated at \$2,500,000, and it is understood that already about 50 American firms have offered to undertake the work.

No. 1 blast furnace of the Ohio plant at Youngstown, Ohio, has been blown out for repairs.

### The Machinists' Scale at Pittsburgh.

(By Telegraph.)

PITTSBURGH, PA., April 29, 1903.—On Tuesday, April 28, a conference was held in the rooms of the Manufacturers' Association in the Frick Building, Pittsburgh, between a number of leading machine shops and a committee from the Pittsburgh district of the International Association of Machinists. The manufacturers were represented by August Snyder of Wilson-Snyder Mfg. Company, John Jackson of the Simonds Mfg. Company, George Mesta of the Mesta Machine Company, Isaac W. Frank of the United Engineering & Foundry Company and W. H. McFadden of Mackintosh, Hemphill & Co. The conference was called for the purpose of arranging a wage scale for machine shops in Pittsburgh, effective from July 1 next, when the present scale expires. Two years ago the machine shops in the Pittsburgh district were unorganized, but a year ago a wage contract was made between the manufacturers and the machinists in organized shops, which was satisfactory to both sides. It provided that there was to be no compulsory effort made by either side to compel machinists working in non-union shops to join the union. At the conference held on Tuesday it developed that the leaders of the Machinists' Union would insist that this year a clause be inserted in the wage agreement compelling employers to employ only union men. This was vigorously opposed by the machine shop owners, and as a result the conference adjourned without any definite agreement being reached. The committee named above, representing the principal machine shops in the Pittsburgh district, issued the following statement: "The Joint Committee adjourned indefinitely, as the committee representing the machinists would not agree to the following clause in proposed contract: 'No person shall be refused employment or in any way discriminated against by either party on account of membership or nonmembership in any labor organization.'" The committee representing the machinists wanted to substitute the following clause: "That during the term of this agreement there shall be employed in the shops of the parties hereto only members of the International Association of Machinists or persons agreeable thereto."

This the committee representing the manufacturers would not agree to.

The present agreement with the machinists, which expires on July 1 next, leaves it optional with employees whether they join the union or not, but if they choose to remain out it is not sufficient cause for dismissal. Unless the machinists' union agree to withdraw this clause, it is possible that there will be a general strike in the leading machine shops in the Pittsburgh district on May 1. Machinists employed in the works of the Westinghouse Electric & Mfg. Company recently organized a local union and a number of men who joined it were at once discharged. The organizers of the union were notified of this action on the part of the company and reported the matter to the Executive Board of the Machinists' Union in session in Milwaukee, Wis. It is stated that a strike may be declared at the Westinghouse Works unless the company recognize the union. This would not inconvenience the concern very seriously, as the number of union men employed at the plant is very small.

**Jones & Laughlin Steel Company.**—PITTSBURGH, PA., April 29, 1903.—The annual meeting of the Jones & Laughlin Steel Company of Pittsburgh was held on Tuesday, April 28. The old officers were re-elected as follows: B. F. Jones, Jr., president; Willis L. King, vice-president; William Larimer Jones, general manager; W. C. Moreland, secretary; Irwin B. Laughlin, treasurer; T. K. Laughlin, assistant treasurer. Directors: B. F. Jones, Henry A. Laughlin, George M. Laughlin, James Laughlin, Jr., B. F. Jones, Jr., Willis L. King, Irwin B. Laughlin, Thomas O'Connor Jones, Roland Gerry, W. C. Moreland, Robert Geddis, W. W. Hillock and H. S. Hiehl. The Jones & Laughlin Steel Company have decided to make some very extensive enlargements to their

works and will probably take up some new lines of manufacture. The exact nature of these new additions has not been given out.

### The Allis-Chalmers Company Secure Blast Furnace Gas Engine License.

An agreement has just been made and become operative whereby the Allis-Chalmers Company become sole licensees for building and selling the blast furnace gas engines of Nurnberg & Augsburg, of Nurnberg, Germany, in the United States, Canada, British Columbia and Mexico. Representatives of the Nurnberg Company are now in this country, and they, together with the Executive Committee of the Allis-Chalmers Company, closed the transaction in New York this week.

The building of the engines will not be confined to any one plant of the American company, although the largest units will of course be most advantageously produced at the New West Allis plant. A 2000 horse-power unit will be built at this plant immediately. It will be exhibited at the St. Louis Exposition.

At present the German company build the engines in units of from 1200 to 2000 horse-power. The Allis-Chalmers Company will not only build these sizes, but will go as high in horse-power per unit as practice in this country demands. The Nurnberg Company now have in their shops upwards of 50,000 horse-power in process of construction.

The consummation of this agreement is an important step in American engineering practice. It was reached after a prolonged and exhaustive investigation on the part of the Allis-Chalmers Company, who have had an engineer abroad for five months making thorough inquiry into the subject.

### Iron and Industrial Stocks.

The general tendency of the market during the past week has been downward, notwithstanding greater ease in money and the absence of any seriously unfavorable news. Nearly all industrial stocks are lower than during the previous week. The greatest decline occurred in American Can preferred, which fell on Tuesday to 41½, on the appearance of the company's financial statement for the year ended March 31, showing only a trifle over 2 per cent. earned toward the preferred stock dividend. A recovery was made subsequently to 45. Low prices touched on Tuesday on some other stocks were 6¾ on Can common, 26¼ on Locomotive common, 63¾ on Colorado, 18¾ on Republic common, 60½ on Sloss-Sheffield common, 63¾ on Tennessee, 34¾ on Steel common, 83¾ on Steel preferred and 27¼ on Dominion. The new Steel 5 per cent. bonds sold down to 84¾.

**Dividends.**—Shelby Iron Company have declared a dividend of 10 per cent., payable May 15. Books close May 5 and reopen May 18.

Pressed Steel Car Company have declared the regular quarterly dividend of 1¾ per cent. on the preferred stock, payable May 19. Also the regular quarterly dividend of 1 per cent. on the common stock, and the second quarterly installment of ¼ of 1 per cent. of the extra annual dividend of 1 per cent. on the common stock, payable May 27. Books for the preferred stock close April 28, and reopen May 19, common stock close May 6 and reopen May 27.

The Standard Sanitary Mfg. Company of Pittsburgh have declared the regular quarterly dividend of 1¾ per cent.

**Labor Unions Responsible for Damages.**—In the trial of an injunction suit, growing out of the strike of the furniture workers at Evansville. Circuit Judge Foster, at Indianapolis, on April 27, made a ruling that marks a departure in strike cases in Indiana. The ruling came up when the court sustained a demurrer of one of the furniture companies, the court holding that a labor union, even though unincorporated, may be sued when the suit pertains to questions affecting the relations of the union membership to public safety and order. The ruling is construed to mean that the union, as an organized body, may be held responsible in damages when injury to persons or property results from its action.

**Information Wanted.**—Correspondent wants gloves made of or covered with chain to be used by men handling hot metal, &c.



## The New York Machinery Market.

NEW YORK, April 29, 1903.

From the viewpoint of new business the month of April was somewhat of a disappointment to some machinery merchants. There was no heavy falling off of orders, but in many quarters of the trade there has been a little talk for the last two weeks of things quieting down slightly. The comparison was made, of course, with the month of March, when business was excellent, in fact better than merchants expected by far. The disappointment of April was felt only in view of the favorable surprises experienced in the month previous. Shops are still overcrowded with work and there are inquiries galore on the desks of machinery dealers. Some very large propositions are still undecided upon and the prospects for the future are still bright.

During the last two or three days machine tool merchants have reported that business was actively on the increase. On the whole, it cannot be said that any unfavorable conditions have arisen. Prices on all classes of machinery are firm. A murmur of complaint is to be heard here and there regarding collections. Some large corporations, including railroads, have been backward in settling their accounts of late. Fortunately, however, such concerns are the exception rather than the rule.

A large machine tool proposition has just been closed by the Baltimore & Ohio Railroad. The aggregate value of the orders is about \$110,000. The tools are to be scattered in various shops along the lines of the company, about \$70,000 worth going west of Pittsburgh. The orders were fairly well scattered, but Manning, Maxwell & Moore are said to have obtained the largest single allotment.

A good sized list of machine tools and accessories has been issued by the Seaboard Air Line Railway. Newton Heston, the company's purchasing agent, whose offices are at Portsmouth, Va., is said to have issued the specifications. We are informed that the machinery is for the equipment of large new shops.

Some time ago the Delaware, Lackawanna & Western Railroad issued specifications for approximately \$50,000 worth of machine tools. Bids were received, but no purchases were made by Purchasing Agent Whalen, who has recently retired from the employ of the company. His successor, Mr. Wilson, has notified the bidders to send new proposals, as the matter is now to be carried to conclusion.

A tip is circulating in Liberty street to the effect that the Erie will soon issue a large machine tool list. An appropriation of \$10,000,000 was made recently for general improvements. It is reported that a good portion of this is to be used in the building of new shops and the modernizing of the present shops.

The Atlantic Coast Line Railroad are purchasing considerable machinery for improving the equipment of their various shops. F. H. Fechtig, whose offices are located in Wilmington, N. C., is the purchasing agent.

Purchases are being made for the equipment of the new plant of the South Atlantic Car & Mfg. Company of Waycross, Ga. A general contract covering a large portion of the equipment has been awarded to Thornton N. Motley, Incorporated, of 12-16 John street, New York, who is subletting the contracts.

The Eastern Shipbuilding Company of New London, Conn., are said to be in the market for new machine tools.

The Gibbs Engineering & Mfg. Company of 8 Bridge street, New York, are equipping a shop on East Forty-second street, between First and Second avenues, New York City, for the building of automobiles. They have been purchasing machine tools during the last few days. The trade view the Forty-second street plant as but a preliminary one.

We are officially advised that the General Electric Company have awarded contracts for the erection of another large machine shop at Schenectady. Nothing has been done as yet toward ordering the necessary equipment.

It is thought that matters are now approaching the point of consummation in connection with the equipment of the plant of the Cerra De Pasca Mining Company at Cerra De Pasca, Peru. This concern intend working an ancient copper property in Peru and erecting a 1000-ton smelter. Plans for the smelter have been completed by Frank Klepetko of 8 Bridge street, New York. Mr. Klepetko is now receiving preliminary estimates on the equipment preparatory to definite decision on the part of the financial interests in the project. J. B. Haggin, the Pacific Coast capitalist, is the principal financial supporter of the enterprise. The specifications issued call for two 700 horse-power Corliss engines direct connected to electric generators; three blowing engines, boilers, air compressors and auxiliary mechanical appliances and machinery. Mr. Klepetko returned from a trip of inspection of the property in Peru on Tuesday, the 21st inst.

Considerable importance is attached to the organization of the Loomis-Pettibone Gas Machine Company. We are authoritatively informed that the new company intend manufacturing gas producers and gas engines in large units. For this purpose an entire new plant will be erected, which

necessarily will be an extensive one. The location of the plant has not been determined upon, although several good sites are under consideration. No machinery has been purchased as yet for the plant, as the plans and specifications are not completed. It is expected to have this portion of the work completed soon, however, as a large corps of engineers are now engaged in bringing it to a close. Benjamin Gugenheimer of 71 Broadway, New York, is the representative of the company. The original Loomis-Pettibone Company have been well known in the trade and in engineering circles for some time. They have had offices at 52 Broadway, and have been prominent in designing gas producer plants in all parts of America. Heretofore they have always purchased their equipment of engines, &c., in the open market, or have simply acted in an advisory capacity to the concerns adopting their system, who conducted their own purchases. The new company will as a manufacturing concern be enabled to build whatever equipment is required in fitting out the producer plants and the engines consuming the gas as well.

The Rand Drill Company through their pneumatic tool department report the recent sales of many large complete air plants, including their new Imperial pneumatic hammers and piston air drills. Plans are now being drawn for an extensive enlargement of the Rand Drill Company works to meet these increased demands.

A. E. Holaday & Co., manufacturers of electrical supplies, of New Haven, Conn., have outgrown their present capacity and decided to expand. At the last stockholders' meeting it was decided to increase the present capital stock to \$50,000 for the purpose of erecting an addition to the plant. In about 90 days the company will place orders for an entire equipment of machine tools and all of the requisite accessories. Some preliminary purchases have already been made of Hill, Clarke & Co. of Boston. The George G. Prentice Company also sold a number of automatic machines of a special type. The company have orders enough booked to keep their present plant busy a year. Their entire output is taken by the H. W. Johns-Manville Company of 100 William street, New York. A. E. Holaday, the secretary and general manager of the company, will be in charge of the new work. P. R. Day of Hartford, Conn., is president of the company, and Dr. Charles L. Beach of the same city is treasurer.

The Wilson Machinery Company of Lancaster, Pa., are in the market for equipment for a 50 x 200 foot addition. They have increased their capital from \$75,000 to \$150,000. They are getting figures on a number of engine and turret lathes, drill presses and other machine tools, boiler, engine, electric generator and motors.

The Rider-Ericsson Engine Company of 35 Warren street, New York, and whose works are located at Walden, N. Y., are preparing for the purchase of considerable foundry equipment. They have prepared plans for a new foundry which will be equipped with modern appliances and labor saving devices. They are in the market looking for improvements in the way of cupolas and brass melting machines which may be used in connection with oil fuel, an air compressor and plant, air hoists, an oil burning arrangement for running a core oven and other appliances. They are not looking at present for engines or boilers or molding machines. The officers of the company are W. M. Sayre, Jr., president; L. A. Bevin, vice-president and secretary, and R. S. Sayer, treasurer.

We are informed that another steam turbine will soon be launched on the market. Negotiations are now on toward securing a site for a factory for building the machines. As the plans of the principals of the new concern are still immature, little can be said at this time. E. C. Crocker of Hartford, Conn., is the prime mover. When things take more definite shape a full line of machine tools, including some very large ones, will be purchased. A 200 horse-power high pressure boiler is also to be contracted for.

The Fulton Bag & Cotton Mills of Atlanta, Ga., who are doubling their plant at a cost of from \$250,000 to \$300,000, are now buying their machinery. They are still in the market for cooling towers and condensers. They have purchased 1600 horse-power Babcock & Wilcox water tube boilers. The officers of the company are Jacob Elsas, president; Oscar Elsas, vice-president; Benj. Elsas second vice-president; August Denk, secretary and treasurer.

The Boston Edison Company have recently purchased from Westinghouse, Church, Kerr & Co. a complete equipment of Roney mechanical stokers, to be installed in their new Central Station, now in process of construction, as we have previously noted. The station is located in South Boston on the water front, and it is understood will be eventually the main station of this company. This is the plant arranged for steam turbo generating power units, and the design of the building and equipment provides for future extensions to any desired capacity. The boilers are of the Babcock & Wilcox Company's 500 horse-power water tube type, and are arranged in batteries of eight boilers each, seven of which aggregate sufficient capacity for supplying one power unit, with an eighth as a reserve. The first consignment will comprise eight boilers aggregating 4000 horse-

power, each fitted with rocking grate stokers of the Roney type.

Westinghouse, Church, Kerr & Co. have recently received the third order for Roney mechanical stokers from the Potomac Electric Power Company, Washington, D. C. The Potomac Company are a new corporation, and have taken over the properties of the United States Electric Lighting Company of Washington, D. C., who formerly operated a large lighting plant at the corner of Fourteenth and B streets. This plant has previously been partially equipped with another type of furnace. A new equipment of four 450 horse-power Babcock & Wilcox boilers fitted with Roney stokers was rushed into service in the early winter to aid in sustaining the winter peak loads upon the plant, and the satisfactory operation has resulted in the provision for extensions above noted. The Roney stoker equipment at present aggregates 2700 horse-power. The New York Central & Hudson River Railroad Company have also ordered Roney stokers for equipping the boiler plant of their new elevator, at Weehawken, N. J. The equipment will comprise four stokers, operating under 2000 horse-power of Aultman & Taylor water tube boilers. The International Railway Company of Buffalo, N. Y., have placed the sixth order for Roney stokers, increasing their present capacity to 6900 horse-power. The Ingersoll-Sergeant Drill Company will install 12 stokers in their plant at Phillipsburg, N. J. Roney stokers of various sizes have also been sold to the Stirling Company for Berwind White Coal Mining Company, Windber, Pa. The American Bridge Company have placed their ninth order.

The American Mfg. Company, 65 Wall street, New York, report that the general demand for transmission rope since the beginning of 1903 has been very large, the number of orders received exceeding those of the same months during 1902 by 65 per cent. While there are but few large orders for this rope coming from the steel plants, the new cotton mills of the South are buying extensively. This company have 75,000 pounds of transmission rope on their books for delivery in the South during the next three months, and have sent half that amount there since the first of the year. The general demand for small orders from every section of the country has also increased about 50 per cent. over last year, and all indications point to the conclusion that rope driving is being very universally adopted by manufacturers, and that the business in transmission rope during the year will be exceedingly large.

The Buhl Malleable Company of Detroit, Mich., announce that their sales in New York City and vicinity will be in charge of A. Z. Boyd, 56 Reade street, New York.

H. E. Maxfield, formerly New York agent for Lawrence centrifugal pumps, 39-41 Cortlandt street, will hereafter be known under the firm name of H. E. Maxfield & Co., with offices at 136 Liberty street, New York. All inquiries received for centrifugal pumping machinery, house pumps, hoisting engines and general machinery will be handled by the new company, who will also execute complete installation contracts for entire pumping sets.

It is reported that the New York, New Haven & Hartford Railroad Company will convert their Harlem River Branch into a high power electric passenger line, and by connecting it with their trolley system running west from Stamford, Conn., form a fast electric route to compete with the New York & Port Chester Electric Road, the building of which now is apparently assured. Officials of the New Haven road will say only that the project is under consideration. It is expected that the new Port Chester line will make very fast time between Port Chester and New York, and if the New Haven system expects to compete for this local traffic it is said that it will have to put in a first-class electrical equipment along the lines indicated.

Probably the largest contract for electrical generators ever placed for use west of the Rocky Mountains has been awarded by Stone & Webster of Boston, managers of electric power, traction, and lighting plants along Puget Sound, to the General Electric Company. The order is for six machines, two to be furnished to the Tacoma Industrial Company for use in their development of the White River, and four to the Pierce County Improvement Company for the work of developing the Puyallup River, including the flow from the Mount Rainier glaciers. The generators will be three-phase, 60-cycle, of 3500 kw. capacity each, at 2300 volts and 225 revolutions. Deliveries will commence next September. Both of these developments are now being carried forward and it is announced that every effort will be made to complete them at the earliest possible date, to meet the growing demands for power in the Puget Sound district and to supply the electric interurban road between Seattle and Tacoma, as well as the railway and power distributing systems in those cities, which are now controlled by Stone & Webster.

Westinghouse, Church, Kerr & Co. recently received an order for the entire mechanical equipment of a new smelter, to be shortly erected in the vicinity of Butte, Mont., by the Pittsburgh & Montana Copper Company. The equipment comprises: Two 160 horse-power Westinghouse compound engines, driving Connorsville blowers. One 85 horse-power

Westinghouse compound engine, driving a 45-kw. direct connected 125-volt generator, with switchboard; two Westinghouse standard engines; four Roney mechanical stokers for 4250 horse-power B. & W. boilers.

The Sherwin-Williams Company, a large paint manufacturing concern operating several factories in the United States and Canada, have purchased a Westinghouse steam turbine power outfit for their Cleveland factory. The power unit to be installed consists of a Westinghouse steam turbine direct connected to a 400-kw. two-phase turbo-generator. The current will be generated at 440 volts and 60 cycles and will be used for general power and lighting purposes throughout the factory. Steam turbine equipments have also within the last month been shipped from the Pittsburgh factory of the Westinghouse Company as follows: The B. F. Goodrich Company, Akron, Ohio, one 400-kw. unit for supplying light and power to shops; the Johnson Harvester Company, Batavia, N. Y., one 400-kw. unit for furnishing power to shops; the Consolidated Railways Light & Power Company, Wilmington, N. C., one 400-kw. unit for railway and lighting service; the Nassau Light & Power Company, Roslyn, L. I., one 400-kw. unit for local lighting, and the S. D. Warren & Co. Cumberland mills, Maine, one 400-kw. unit for furnishing light and power to the company's mills, located at this point; the De Beers Mines, Kemberly, S. A., two 1000-kw. units.

The Power Specialty Company, 126 Liberty street, New York, have received orders from the Interborough Rapid Transit Company of New York for four superheaters to be installed in their new Fifty-ninth street power station; from the City of New York for two superheaters, one for the Ninety-eighth street pumping station and the other for the 179th street pumping station; from the Kentucky Refining Company of Louisville, Ky.; New York Central Railroad for their new Weehawken plant; from the Wellman-Seaver-Morgan Engineering Company for one superheater similar to one installed by them in October, 1901; from E. Keeler & Co. for a superheater for the Jersey Shore plant of the Williamsport Passenger Railway Company, and from the Enterprise Mfg. Company of Philadelphia for three superheaters to be exact duplicates of one furnished for them in October, 1902; also an order from the Massachusetts Electric Company for superheaters for their Quincy Power Station, the steam from these superheaters to be used in connection with a 3000-kw. Curtis turbine, and also an order from the Carbondale Machine Company for a superheater to be used in connection with an ice machine they are building.

**Catalogues Wanted.**—R. M. Hilgenstock of 35 North Fifteenth street, Philadelphia, who is a member of a committee to report on smoke combustion, requests that catalogues be forwarded to him giving information relative to mechanical stokers, &c.

An illustration of a refusal to arbitrate on the part of union employees is presented at Syracuse, N. Y., in the instance of the strike at the H. H. Franklin Mfg. Company's plant. The men have recently gone on strike for nine hours' work at ten hours' pay. Like most of the factories in Syracuse, this one operates on a 59-hour basis. During the summer months of last year the plant was closed at noon on Saturdays, making a 55-hour week without reduction in pay. The same terms were offered the men for this year, beginning with May, the company offering at the time to go on a nine-hour basis in the fall if it was then found feasible. This offer was rejected by the men and the company offered to arbitrate. The men presented the ultimatum of "nine hours or nothing," and went out. It is thought that this is a forerunner of a general movement planned against the Syracuse employers by the unions.

The friction of locomotive bearings would seem to be excessive considering the concentration of the entire weight upon them, but it is really moderate when figured out. An engine of, say, 60 tons net, has four main bearings, which are 8 inches in diameter by 12 inches long; the projected area of each axle is 96 square inches and the weight on the four is 86,360 pounds, or only about 250 pounds on each square inch of bearing surface, which is quite moderate, so far as lubrication is concerned.

A new situation arises out of the substitution of coal for natural gas in Indiana tin plate mills. The "hot mill" has become so hot that many workmen have quit. The rearrangement of the furnaces for coal burning has put them closer together and the discomfort from heat is intensified. There has been little warm weather yet, but workmen, figuring on what is ahead of them, decided to seek cooler employment.



## Milestones in the Progress of Bituminous Coal Mining.

BY FREDERICK E. SAWARD, NEW YORK.

Practically no statistics of soft coal output are available for the years prior to 1840, and figures are but fragmentary up to 1869, but for subsequent years figures are available. Particularly noticeable is the growth of the soft coal tonnage in the last half-dozen years. It might reasonably be supposed that with an output on such a large scale the rate of increase would become smaller, but it goes forward with mighty strides, and the prolongation of the line of output indicates a tonnage of 360,000,000 tons, a million tons a day, for every day in the year, practically, at a time no further distant than 1906. At present the bituminous tonnage is five times as great as the anthracite output, and yet Pennsylvania continues to supply its full proportion of the entire amount, and (including anthracite output) turns out more coal than all the other States together.

The bituminous coal trade has about quadrupled since 1885. The increase alone of the year 1903, as compared with 1900, is as much as the whole aggregate output of the United States in all years prior to 1857. Since 1896 the increase in tonnage has been constant and very nearly regular, amounting in all to 145,000,000 tons, and practically doubling the tonnage. The bituminous trade may now be said to be five times as large in volume as the anthracite business. It is three times as great now as it was no further back than 1887 and five times as great as in 1882. The output of this year will be as great as the total production for all years prior to 1871, and adding the output of 1902 and 1903, we have a tonnage equal to all the business prior to 1880.

Scarcely less noticeable than the volume of the bituminous business is the concentration of control, so that now a score or more of companies control a tonnage nearly equal to one-half of all the soft coal used in the United States, and as to utilization of bituminous coal, we may say that there appears no reason, despite the large increase in tonnage, to change our assertion of a few years back that one-half of the whole output is used by the railway and steam navigation companies of the United States and Canada.

The mining of the present tonnage of bituminous coal means that each year there is excavated from the earth and drawn to the surface, ton by ton, a mass of mineral covering an area as large as Central Park in New York and 225 feet deep or high. Such are the dimensions in the solid. As broken up for commercial purposes it would form a mass 337 feet in height, or nearly five times the height of the obelisk. Multiplying this by 10, 20 or 30, as the case may be, one can readily see what an enormous quantity of the earth's substance is converted into atmospheric gases in a few years; less than 10 per cent. remains on the surface as ashes.

By all the facts and figures at hand, and as shown above, it is only too evident that this branch of the fuel industry of our country is bound to grow at an interesting pace. The uses to which this fuel is put are so many and varied, as compared with any other, that it has opportunities not open to hard coal. It is one of the most interesting facts in connection with its history that it is giving forth greater and better results, ton for ton and pound for pound, as the years go by. Were this not so perhaps many of those who have industrial establishments in certain parts of the country would have found the necessity of a change of location. The New England manufacturer is certainly raising more steam from a ton of good American bituminous coal at this day than he was doing a decade or two ago.

As an appendix to this statement of the growth of this industry the following historical facts are of the greatest interest:

1679, Father Hennepin discovered a "cole mine" on the Illinois River.

1684, Privilege granted by William Penn to mine coal in Pittsburgh.

1728, Col. William Byrd reported discovery of Virginia coal.

1750, Richmond, Va., coal mined and marketed.

1758, Discovery of coal in Coal Hill, opposite Pittsburgh, on the Monongahela.

1766, Richmond coal advertised at 12 pence per bushel.

1773, Washington advertised coal lands in the Baltimore American.

1774, Coal discovered at Deep River, North Carolina.

1786, Coal discovered at Chinchogak Bay, Alaska.

1789, Richmond coal sent to New York and Philadelphia.

1802, First shipment of Pittsburgh coal to Cincinnati.

1804, Coal first mined near Frostburg, Md.

1810, Coal mined in Summit County, Ohio. The Big Muddy, Illinois, district began shipments.

1811, Coal mined in Fulton, Perry County, Ind.

1817, Shipments of Pittsburgh coal to Ohio River ports began.

1818, Cincinnati coal trade was 116,000 bushels.

1825, Pittsburgh coal receipts were 35,714 tons.

1828, Thirty tons of coal received at Cleveland via canal from Akron, July 4. Baltimore & Ohio commenced.

1830, Pittsburgh coal shipped to New Orleans. Cumberland coal shipped in barges on the Potomac.

1832, Massillon, Ohio, coal shipped by canal.

1833, First systematic mining on the Ohio River, Pomeroy Bend, Ohio.

1834, First mention of coal in Alabama by Dr. Alex. Jones.

1835, Coke first used in a blast furnace, Huntingdon County, Pa.

1836, Ohio coal by canal to Cleveland amounted to 5100 tons. Towboat "Condor" operated, the first in Ohio River coal trade. Coal mined on the Coosa in Alabama.

1838, Ohio produced 107,100 tons. Kentucky River trade 35,714 tons.

1839, Illinois produced 13,427 tons.

1840, Missouri produced 8903 tons. Blossburg district opened. Monongahela Navigation Company began business. Tennessee coal first reported as being marketed. North Carolina reported coal produced.

1842, Maryland shipments by Baltimore & Ohio began.

1843, Pennsylvania Canal (Western division) carried 973 tons of Allegheny Mountain coal. Lake steamers used Brier Hill coal.

1844, Brier Hill, Ohio, coal shipped East and West.

1845, Slackwater navigation on the Monongahela River completed; tonnage, 95,000. Raw Ohio coal used at Clay Furnace, Mercer County, Pa. Tennessee coal by the Tennessee River to New Orleans reported.

1846, The great Breckenridge coal field opened. Ohio coal used in blast furnace at Poland.

1847, Virginia coal to Philadelphia, 9600 tons.

1848, First discovery of coal in Washington.

1849, Blossburg coal in Buffalo, 5967 tons; to Oswego, 2950 tons. Coal from Erie sold at Chicago \$4.50.

1850, Maryland shipments via canal began. Ohio output was nearly 320,000 tons. Pennsylvania output, 750,000 tons.

1852, First production of coal on the Pacific Coast at Newport on Coos Bay.

1853, Westmoreland region first exploited by Coleman, Hailman & Co. First coal east over the Pennsylvania Railroad.

1854, Corning & Blossburg Railroad business 300 tons. Cleveland & Pittsburgh and Cleveland & Mahoning railroads opened to coal fields. Westmoreland Coal Company chartered.

1855, Baltimore & Ohio shipments from West Virginia began. Mount Diablo, Cal., mining began.

1856, Barclay district opened. Broad Top district opened. Shipments from La Salle, Ill., commenced.

1857, Bellingham Bay district, Washington, opened.

1858, Indiana block coal district opened. Irwin, Pa., gas coal field opened and shipments begun.

1859, Pittsburgh & Connellsville Railroad to coke district opened.

1860, First shipments from Bellingham Bay, Wash. Tennessee Coal, Iron & Railroad Company incorporated.

First coke furnace south of the Potomac, at Chattanooga, East Tennessee Iron Company.

1862, Clearfield district opened. Iowa production began. Corral Hollow mines, California, opened.

1863, First regular shipment of Pittsburgh coal to Cleveland for gas making.

1864, Domestic soft coal at Chicago \$17. Nova Scotia coal sold at Boston \$10.40 average for the year. Colorado output, 500 net tons. Clearfield district began shipments.

1865, Cumberland coal sold at \$7.57 at Baltimore; freight to Boston, \$3.79, average for years. Kanawha River shipments, in quantity, first made.

1867, Danville, Ill., district began business. Rockwood Furnace, Roane County, Tenn., began operations.

1868, Michigan output was about 25,000 tons. Union Pacific mines, at Carbon and Rock Springs, Wyo., opened.

1869, Alabama product, 11,000 tons. Kansas output, 32,938 tons. Hocking Valley Railroad opened to Nelsonville.

1870, Bituminous product first exceeded anthracite in quantity. McIntyre district opened. Hocking Valley tonnage, 50,000 tons. Indiana block coal district became important.

1871, Straitsville, Ohio, district began operations. Shipments began at Seattle, Wash. Initial stages of the great coke making industry began in the Connellsville region.

1872, Somerset district opened. Chesapeake & Ohio Railway began shipments at Richmond. Pennsylvania Railroad shipments from Cumberland region began. L. & N. Railroad developed coal fields of Western Kentucky. Coal mined at McAlester, Ind. Ter.

1874, Alabama product, 49,889 tons. First cargo of Webster coal shipped.

1875, East Broad Top district opened.

1876, Colorado Fuel & Iron Company began producing.

1877, Improvement of Great Kanawha began. Output of Utah, 10,000 tons. Lechner (now Jeffrey) mining machine first used.

1878, Eastern Ohio coal shipped to Cleveland via C., L. & W. Railway.

1879, Colorado coke sold at \$45 per ton in home district.

1880, Coke product of United States, 3,338,300 net tons. Harrison mining machine first used by St. Bernard Mining Company, Kentucky.

1881, West Virginia Central & Pittsburgh Railway began shipments. Lehigh mines in Indian Territory began.

1882, Chesapeake & Ohio Railway opened to Newport News.

1883, Norfolk & Western Railway opened to Pocahontas, and shipments at Norfolk began. Rochester & Pittsburgh Railroad opened. Output of Montana, 19,795 tons.

1884, Beech Creek Railroad opened to Peale. Michigan output for year, 36,712 tons.

1885, Bituminous product twice as great as anthracite tonnage.

1886, Baltimore & Ohio Railroad line to New York opened December 15. Tennessee Coal, Iron & Railroad Company began operations in Alabama.

1887, Northern Pacific Railroad Company abandoned mine at Sims, Dakota. Colorado Fuel Company commenced operations.

1889, Initial developments in Alabama culminating. H. C. Frick Coke Company became pre-eminent.

1890, Bituminous product three times as great as anthracite. Union Pacific mine at Hanna, Wyo., opened.

1892, Coal mined in Pittsburgh district, year, 12,000,000 tons. Tennessee Coal, Iron & Railroad Company bought De Bardeleben Coal & Iron Company. Colorado Fuel & Iron Company organized.

1893, Clearfield & Mahoning Railroad. Du Bois to Clearfield, Pa., opened.

1894, General strike of soft coal miners, except in West Virginia.

1895, First Shenango car ferry put in operation on Lake Erie, August 17.

1897, Lowest seaboard price ever recorded, \$1.05, f.o.b. Philadelphia. Second great strike of bituminous miners; preliminary steps taken for Inter-State agreement.

1898, First joint conference and Inter-State wage agreement, Chicago, January 17.

1899, Pittsburgh Coal Company and Monongahela River Consolidated Coal & Coke Company formed.

1900, Allegheny Valley Railway leased by the Pennsylvania Railroad Company. Union Pacific mine at Spring Valley, Wyo., opened. Coke output exceeded 20,000,000 net tons.

1901, Bituminous product four times as great as anthracite. C. & O., N. & W. and B. & O. brought under control of the Pennsylvania Railroad Company. Coke output of the United States was 21,795,883 tons.

1902, Beech Creek extension opened. Great coal land development in the Pittsburgh region and construction of Wabash extension to Pittsburgh. Pennsylvania Railroad carried 27,000,000 net tons of soft coal. Clearfield coal sold at \$7.50 at the mines.

### March Imports and Exports.

Imports of iron and steel in the month of March were much heavier than in February, even taking into consideration the greater length of the month. The totals were, respectively, 126,575 and 97,908 tons. As compared with March of last year, a very great increase of course is shown. The details are as follows:

#### Imports of Iron and Steel.

Commodities.	March,	
	1903.	1902.
	Gross tons.	Gross tons.
Iron ore.....	55,900	82,123
Pig iron.....	59,628	17,184
Scrap.....	7,327	1,855
Bar iron.....	3,986	1,597
Rails.....	17,880	1,172
Hoop, band or scroll.....	219	17
Billets, slabs, bars, &c., steel in forms n.e.s. ....	31,465	6,570
Sheets and plates.....	320	619
Tin plates and terne plates.....	3,478	5,618
Wire rods.....	1,778	775
Wire, and articles made from.....	450	357
Chains.....	29	33
Anvils.....	15	18
Totals, except ore.....	126,575	35,815

The exports show a gain on February, the total for March being 26,627 tons against 21,727 tons in the former month. The comparison with the figures for March of last year is interesting. Details are as follows:

#### Exports of Iron and Steel.

Commodities.	March,	
	1903.	1902.
	Gross tons.	Gross tons.
Pig iron.....	1,532	1,716
Scrap.....	659	907
Bar iron.....	3,299	809
Wire rods.....	2,748	1,030
Steel bars.....	914	984
Billets, ingots, blooms.....	157	93
Hoop, band and scroll.....	285	59
Iron rails.....	7	5
Steel rails.....	415	8,036
Iron sheets and plates.....	118	310
Steel sheets and plates.....	1,438	790
Tin plates and terne plates.....	20	197
Structural iron and steel.....	1,939	11,695
Wire.....	10,158	6,766
Cut nails.....	555	458
Wire nails.....	2,236	1,849
All other nails, including tacks.....	147	129
Totals.....	26,627	35,833

### Chicago Foundrymen's Meeting.

(By Telegraph.)

CHICAGO, ILL., April 29, 1903.—A general meeting of the foundrymen of Cook County has been called for this afternoon at 2 o'clock to listen to the report of the committees upon Constitution and By-Laws and upon Arbitration. The Arbitration Committee met the representatives of the Iron Molders' Union on Saturday afternoon and submitted a counter proposition respecting the molders' compensation. The foundrymen proposed to pay \$2.75 for nine hours, or \$3 for ten hours' work. It will be remembered that the molders have demanded \$3 per day and nine hours to constitute a day.



# HARDWARE.

THE question as to the course to be pursued in regard to disclosing methods or plans which have been found successful is often presenting itself to merchants and manufacturers. There is on the part of many a hesitancy to speak frankly on these subjects if there is any possibility that their words will come to the ear of a competitor, and consequently a marked reserve is often observed in such matters, disguised perhaps by candid reference to some of the things which they regard as of little significance. There are others who, without indeed telling everything or giving the world the benefit of all their experience, are exceedingly outspoken in such matters and keep back comparatively little. While this is largely a matter of temperament and disposition there is probably among business men a tendency to greater frankness and a willingness to discuss their methods and governing principles freely.

In the freedom with which improved methods and the results of experience are disclosed, there is, so far as manufacturing interests are concerned, a wide diversity in the spirit and practice which prevail in this country as compared with England and the Continent. Here it is comparatively easy for the stranger to get access to factories and to see the manufacturing methods which are pursued, while on the other side such privilege would be rarely and reluctantly conferred. There is, however, even with us a wide difference in the disposition of manufacturers in this regard. Some of them guard their workshops most strictly against the intrusion of outsiders, and especially of competitors, who might learn something by which they could improve their own manufacturing methods. Others throw their doors practically open, fearing only the interruption to work and loss of time occasioned by the visits of strangers. The latter course is the more characteristically American. An admirable illustration of this spirit has been repeatedly given in the frank and fearless way in which factories and plants of almost every kind have been opened for the inspection of foreign visitors, whose object in coming was confessedly to learn all in their power about American ways with a view to improving their own. In spite of the fact that the information thus gained would, in the world-wide battle for trade, be used against this country, the representatives of foreign interests have been given very free access to factories and works in almost every line.

This privilege of visiting factories has sometimes been abused, and manufacturers have in some cases been restricting or withdrawing it. The presence of strangers in the factory is also, even at the best, undesirable, as valuable time is occupied in showing them through the different departments, and more or less interruption of the regular course of things is occasioned by their presence. There is no doubt, however, that the frank and open spirit in such matters which is generally shown in this country is an evidence of progressiveness, and indicates the manufacturer's confidence in his position and his reliance on his ability to keep his methods up to date and in advance of those of any competitor. He realizes, too, that imitators are not often formidable as rivals, and that a stern chase is a long one.

## Condition of Trade.

Considering the advance in the season, trade continues in excellent volume. Outdoor activities, especially in agricultural sections, interfere, however, with the business of retail merchants, but what is lost in this way finds doubtless some counterbalance in the increase of trade in other directions. Jobbers generally are well supplied with goods, and their purchases have recently fallen off so that the amount of new business coming in to manufacturers is not so heavy as it has been. A noticeable feature of recent trade is the fact that jobbers are placing their orders a longer time in advance of the season when the goods are needed than has been usual during past years. The reason for this is found in the activity of trade and the difficulty frequently experienced in getting goods when required if their purchase has been too long deferred. Manufacturers continue in many lines to be behind their orders, the production of goods being interfered with by the causes with which the trade are familiar—difficulty in getting material, delays in transportation, &c. There is also more or less difficulty experienced in connection with labor, which in some cases is scarce and in others restless, if not actually on strike. The various influences at work in the market tend to give strength to prices, and many lines are decidedly firm, even if they have not lately recorded an actual advance. The generally gratifying indications for the crops are influencing the market toward continued strength and confidence.

### Chicago.

(By Telegraph.)

From the standpoint of both the manufacturer and the jobber the month of April shows a falling off in trade from the preceding month, and as far as determined scarcely equal to the tonnage placed in April a year ago. In Wire products, however, business is still quite active, especially for Plain Wire and Wire Fencing, the demand for which is urgent and indeed unprecedented. There has been some falling off in new orders for Barb Wire and a decided decrease in new business for Nails, yet shipments during the month have been several thousand tons larger than during April, 1902. Although fuel is plentiful, the mills are hampered by lack of Billets, Bars and Rods, and some mills are handicapped by being unable to secure a lower class of labor. The fact remains, however, that the principal Wire interest in the market have orders booked which will keep them busy to full capacity to July 1. Independent mills, too, report full capacity sold for 30 days. An interesting feature in the Builders' Hardware department is the new arrangement effected between some of the leading manufacturers who desire to throw the labor and expense of figuring large bills of Hardware upon the dealer, the manufacturers refusing to make "lump" prices on such contracts hereafter. The city trade in Builders' Hardware has continued quiet, but there has been a fair country order demand and several large contracts are pending. Among those placed recently is that for the Merchants' Exchange Building, San Francisco, which has been filled from existing stocks. The contract amounts to between \$3000 and \$4000. It is reported that keen competition among manufacturers of Axes, Stove Pipe and Elbows has resulted in cutting of prices to a considerable extent, but the volume of business has been quite considerable. Sales, therefore, have been heavy, some manufacturers having sold their entire production for six months. The character of the jobbing trade has not changed essentially during the week other than sales have fallen off somewhat. The drop in the price of Lead and the advance in Spelter have been reflected somewhat in the manufactured product, higher prices being asked for Sheet Zinc. In Heavy Hardware there has been a fair volume of business without new features. There has continued to be quite a liberal movement in Refrigerators, Lawn Mowers, Ice Cream Freez-

ers, Steel Goods and Specialties, some jobbers reporting more satisfactory shipments from factories.

### St. Louis.

(By Telegraph.)

The demand on the jobbers for Hardware holds remarkably steady and firm, and a comparison with the extremely heavy sales of last month shows in many cases an increase. When referring to the season's trade in Barb Wire, Plain Wire, &c., one of our large jobbers reports that while they filled a large demand they could have exceeded their sales by at least 50 per cent. had it been possible to secure the necessary supplies from the mills. There is a large amount of building going on in St. Louis that is made absolutely necessary by the coming World's Fair, but we find it quite a pronounced opinion that other building operations of a permanent and lasting character are being very generally postponed until after the event. The conditions ruling in the labor as well as the material market in the matter of high prices are the factors that seem to be unfavorable and serve to hold back, except where the building operations are absolutely imperative. Shipments of Saws, Mallets, Bits, &c., from the old line manufacturers are still slow in coming forward. Builder's Hardware finds a very good demand from both local and outside sources. We might again note the large call for Refrigerators, Ice Cream Freezers, Lawn Mowers and many other specialties of a household nature. The Heavy Hardware trade is dominated by a very fair and steady demand for Small Angles and Channels, and Iron and Steel Bars, Carriage and Wagon Hardware, &c.

### NOTES ON PRICES.

**Wire Nails.**—The market is in a satisfactory condition. Specifications on contracts are coming in freely and with new orders the mills are kept fully employed. The scarcity of Steel and the crowded condition of the mills cause some delay in making prompt shipments. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

Jobbers, carload lots.....	\$2.00
Retailers, carload lots.....	2.05
Retailers, less than carload lots.....	2.15

**New York.**—Dealers in the territory tributary to this point are showing conservatism in buying, owing to the uncertainty of labor conditions after May 1. Purchases are confined to immediate wants, being merely to sort up stocks. Quotations are closely adhered to, and are as follows: Single carloads, \$2.20; small lots from store, \$2.25 to \$2.30.

**Chicago, by Telegraph.**—A decrease is reported in the amount of new business coming forward, but both the largest interest and independent mills are still well supplied with orders and shipments are being made more readily. The mills, however, are prevented from making full time for various causes and the market continues very firm in tone, full prices being readily realized. Some difficulty is experienced because of broken assortment of sizes. The jobbing trade has continued of satisfactory proportions. Official prices are \$2.15 to \$2.20 in carload lots, f.o.b. Chicago. Broken cars sell at 5 to 10 cents higher. For galvanizing 75 cents per keg and for tinning \$1.50 extra per keg is charged.

**St. Louis, by Telegraph.**—Continuance of the very good demand for Wire Nails is reported by the jobbing trade, and a quotation of \$2.35 in small lots is named.

**Pittsburgh.**—There is nothing of special interest to note in the Wire Nail trade this week. The output of the mills is restricted to some extent by the continued scarcity of Steel, but the fact that a large Bessemer works of the Carnegie Steel Company, at Youngstown, Ohio, has recently been changed from Rails to Billets will soon relieve the scarcity of Steel to some extent at least. The Wire Nail mills are steadily employed, mostly on contracts placed some time since, but a good many new orders are being received. The tone of the market is firm, and prices, we are advised, are being firmly held. We quote Wire Nails \$2 in carloads to jobbers, \$2.05 in carloads to retailers and \$2.15 in small lots, f.o.b. Pitts-

burgh, 60 days, or 2 per cent. discount for cash in 10 days; for galvanizing Nails 75 cents per keg is charged and for tinning Nails \$1.50 per keg extra.

**Cut Nails.**—At a meeting of the Cut Nail Association, held on April 25, ruling prices were reaffirmed for the month of May. While there was an inclination on the part of some of the manufacturers to advance prices, it was deemed prudent not to make any change, in view of the difference in price of 15 cents between Wire and Cut Nails, and other conditions of the situation. Prompt deliveries are difficult to obtain, owing to delays at the mills on account of the trouble experienced in getting Steel. The market is strong and quotations are as follows: \$2.15, base, in carloads, and \$2.20 in less than carloads, f.o.b. Pittsburgh, plus freight in Tube Rate Book to point of destination; terms 60 days, less 2 per cent. off in 10 days.

**New York.**—The local demand is fair, and some sizes are scarce, owing to delayed shipments from mill. Quotations for carloads and less than carloads are as follows:

Carloads on dock.....	\$2.20
Less than carloads on dock.....	2.33
Small lots from store.....	2.40

**Chicago, by Telegraph.**—While some improvement is reported in shipments, the mills are much delayed from the inability of obtaining Steel promptly. There has been a fair current order trade, and the market has remained firm in tone, sales being made on the basis of \$2.30 in carload lots and \$2.35 in less than carload lots for Steel, Chicago. Iron Nails are held at \$2.45 to \$2.50 per keg from store.

**St. Louis, by Telegraph.**—Cut Nails are meeting with a very steady demand. Jobbers' quotations are unchanged. Steel at \$2.40 and Iron at \$2.60.

**Pittsburgh.**—Shipments of Cut Nails from the mills are delayed to some extent by the continued scarcity of Steel. There is a good demand for Cut Nails, and the mills are working full time, mostly on large contracts placed prior to the recent advance in prices. The tone of the market is strong, and we quote: Steel Cut Nails, \$2.15, base, in carloads and \$2.20 in less than carloads; Iron Cut Nails, \$2.25, base, in carloads and \$2.30 in less than carloads, plus freight in Tube Rate Book to point of destination, 60 days, less 2 per cent. off in 10 days.

**Barb Wire.**—New business is confined to small lots, but filling specifications on contracts is keeping mills employed. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

	Painted.	Galv.
Jobbers, carload lots.....	\$2.30	\$2.60
Retailers, carload lots.....	2.35	2.65
Retailers, less than carload lots.....	2.45	2.75

**Chicago, by Telegraph.**—The new tonnage coming forward has shown a decline compared with previous weeks, and mills have been able to make some progress in the filling of old contracts. The situation, however, has not changed radically, manufacturers still having a heavy unfilled tonnage. The jobbing trade has continued quite liberal and the market has remained firm. Galvanized Wire has been made on the basis of \$2.75 to \$2.80 in carload lots, and Painted at \$2.45 to \$2.50, the outside price being to retailers. For small lots 5 to 10 cents extra is charged. Staples in carload lots sell as follows: Polished, \$2.30 to \$2.35, and Galvanized \$2.70 to \$2.75, the outside price being to retailers.

**St. Louis, by Telegraph.**—Trade through the jobbing trade for Barb Wire continues in very good volume. In small lots from store, Painted is quoted at \$2.65 and Galvanized \$2.95.

**Pittsburgh.**—Deliveries of Barb Wire are very much better than some time since, as the mills are catching up on contracts. New tonnage being placed is small, the large contracts having been placed some time since. It is not believed there will be any advance made in prices, which are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days: Painted, \$2.30; Galvanized, \$2.60, in carloads to jobbers; Painted, \$2.35; Galvanized, \$2.65, in carloads to retailers; Painted, \$2.45; Galvanized, \$2.75, in small lots to retailers.



**Smooth Fence Wire.**—The current demand is quite heavy, but for small lots in most instances. These, with specifications on contracts, are keeping the mills fully employed. Quotations are as follows, f.o.b. Pittsburgh, terms 60 days, or 2 per cent. discount for cash in 10 days:

Jobbers, carloads.....\$1.90  
Retailers, carloads.....1.95  
Less than carloads.....2.05

The above prices are for base numbers, 6 to 9. The other numbers of Plain and Galvanized Wire take the usual advances, as follows:

6 to 9	10	11	12	12½	13	14	15	16	
Base.	\$0.05	.10	.15	.25	.35	.45	.55	Annealed.	
\$0.30	.35	.40	.45	.55	.65	1.05	1.15	Galvanized.	

**Chicago, by Telegraph.**—There has been an unusually urgent demand for both Smooth Wire and Wire Fencing. The new business being of large proportions in some respects is unprecedented. Although shipments are coming forward more rapidly, the situation is not much relieved. Orders received by jobbers have been liberal and the market remains firm. The following are the prices current: Nos. 6 to 9 on the basis of \$2.05 to \$2.10 in carload lots on track and \$2.15 to \$2.20 in less than carloads from store, Galvanized bringing 30 cents extra for Nos. 6 to 14 and 60 cents extra for Nos. 15 and 16.

**St. Louis, by Telegraph.**—Jobbers report conditions of trade for Smooth Fence Wire as being very steady and in very fair volume. No. 9 at \$2.30 and Galvanized at \$2.60 in small lots from store is the general quotation, but in some instances these prices are shaded.

**Pittsburgh.**—New demand is fair, and the mills are busily employed on old contracts, specifications on which are coming in at a satisfactory rate. Prices continue firm, and are as follows: Plain Wire, \$1.90, base, for Nos. 6 to 9 in carloads to jobbers, \$1.95 in carloads to retailers and \$2.05 in small lots to retailers; Galvanized, 30 cents extra for Nos. 6 to 14 and 60 cents extra for Nos. 15 and 16.

**Hickory Handles.**—We give below the revised list of Hickory Handles which was referred to in our last issue. It will be observed that there has been a general revision and an advance in the list prices. It is subject to a discount to the trade of from 40 and 10 to 50 per cent.:

#### TURNED HANDLES.

##### Turned Hickory Axe Handles.

Market and N. N. Y. patterns.	Extra.	Exler.	No.1.	No.2.	No.3.
36 and 34 inch.....per doz.	3.75	3.00	2.50	2.00	1.65
32 and 30 inch....."	3.75	3.00	2.50	2.00	1.65
Boys' 28 and 26 inch...."	2.75	2.25	1.80	1.50	...
38 in. single and d'ble bit. "	4.00	3.25	2.60	2.10	1.70
40 in. single and d'ble bit. "	4.50	3.75	3.00	2.20	1.80
42 in. single and d'ble bit. "	5.00	4.00	3.20	2.40	1.90
44 in. single and d'ble bit. "	5.60	4.50	3.50	2.60	2.00
Straight, 30 to 36 inch...."	3.75	3.00	2.50	2.00	1.65
D'ble bitted, 30 to 36 inch. "	3.75	3.00	2.50	1.80	1.50

##### Hand Shaved Hickory Axe Handles.

Octagon and Oval Hand Shaved, single and double bit.	XXX.	XX.	X.
36, 34, 32 and 30 inch, plain end.....per doz.	4.50	3.60	2.80
38 inch, plain end....."	4.60	3.80	3.00
40 inch, plain end....."	5.00	4.10	3.25
36 and 34 inch, scroll end....."	4.70	3.90	3.10
36 inch, Straight Lumberman's....."	4.40	3.60	2.80
38 inch, Straight Lumberman's....."	4.60	3.80	3.00
Broad Axe Handles.....per dozen.	\$3.75		
Extra. Exler. No. 1.			
Adze, House Carpenter, Ship and R. R., 36, 34 and 32 inch.....	4.00	3.50	2.75

##### Turned Hickory Pick Handles.

Surface or R. R., Mattock and Miner's.	Extra.	Exler.	No.1.	No.2.	No. A.
Pick Handles:					
Surface or R. R., 36 in. per doz.	4.50	3.75	3.00	2.25	1.90
Drifting, 32, 34 and 36 in. "	3.75	3.00	2.50	...	...
Poll, 32, 34 and 36 in. "	3.75	3.00	2.50	...	...
Coal Miners' Small Eye, 3 x ¾, 34....."	3.25	2.15	1.75	...	...
Coal Miners' Medium Eye, 3 x ¾, 34....."	3.25	2.15	1.75	...	...
Coal Miners' Large Eye, ¾ x ¾, 34....."	3.25	2.15	1.75	...	...
Grub Hoe Handles, 36 inch "	4.50	3.75	3.00	2.25	1.90
Post Maul Handles, 30 to 36 inch....."	3.50	3.00	2.50	2.00	...
Hand Shaved Pick, add 45 cents per dozen to above prices.					

#### Turned Sledge, Tool and Maul Handles.

Sledge, Tool or Maul.	Length.	24	26	30	32	34	36	38	40	42
Extra.....per doz	1.45	1.90	2.10	2.50	2.65	2.85	3.10			
No. 1....."	1.25	1.45	1.65	2.00	2.15	2.25	2.50			
No. 2....."	.90	1.15	1.25	1.40	1.50	1.75	2.00			
Hand Shaved Sledge, add 40 cents per dozen to above prices.										

#### Turned Hammer and Hatchet Handles.

	11	12	13	14	15	16	17	18	19	20	22	24 in.
Machinists' Hammer.....	.70	.70	.70	.70	.70	.80	.80	.90	1.05	1.05	1.15	1.25
Blacksmiths' Hammer.....	.70	.70	.70	.70	.70	.80	.80	.90	1.05	1.05	1.15	1.25
Riveting Hammer.....	.70	.70	.70	.70	.70	.80	.80	.90	1.05	1.05	1.15	1.25
Hammer, A. & R. E.....	.70	.70	.75	.75	..	..	..	..	..	..	..	..
Hatchet, broad or bench.....	..	..	..	..	..	.85	.90	1.10	1.25	1.25	..	..
Hatchet, Shingle.....	.70	.70	.75	.75	..	..	..	..	..	..	..	..

#### Second Growth Shaved Axe Handles.

	30 to 36	38	40	42	44
Single and Double Bit. Inch.	inch.	inch.	inch.	inch.	inch.
Octagon and Oval.....per doz.	5.00	5.40	5.75	6.30	6.90

#### Second Growth Pick Handles.

	30	32	34	36
Octagon and Oval. Inch.	inch.	inch.	inch.	inch.
Drift Pick.....per doz.	4.70	4.70	4.70	4.70
Poll Pick....."	4.70	4.70	4.70	4.70
Coal Pick....."	4.00	4.00	4.00	4.00

#### Second Growth Sledge, Tool and Maul Handles.

	24 in.	28 in.	32 in.	36 in.	38 in.	40 in.	42 in.
Octagon and Oval. 26 & 30 & 34 & 24 in.	2.00	2.50	2.70	3.10	3.35	3.60	3.90

#### Second Growth Hatchet and Hammer Handles.

	12	13	14	15	16	17	18	19	20	22	24 in.
Hatchet, Shingling.....	.90	.90	.90	.90	..	..	..	..	..	..	..
Hatchet, broad or bench.....	..	..	..	..	1.00	1.10	1.35	1.50	1.60	..	..
Machinists' Hammer.....	.90	.90	.90	.90	1.00	1.10	1.10	1.35	1.35	1.65	2.00
Blacksmiths' Hammer.....	.90	.90	.90	.90	1.00	1.10	1.10	1.35	1.35	1.65	2.00
Riveting Hammer.....	.90	.90	.90	.90	1.00	1.10	1.10	1.35	1.35	1.65	2.00
A. E. & R. E. Hammer.....	.90	.90	.90	.90	..	..	..	..	..	..	..

**Axes.**—Within the past few weeks the Axe market has developed decidedly unsatisfactory conditions. The effort made by the manufacturers to maintain prices has been unsuccessful and there has been a break to a point below that at which contracts were placed a year ago. The jobbing trade in their suspicion of the market, which is thus shown to have been well founded, deferred purchasing to a later date than usual, and it is understood that a good many of them have not even as yet placed their orders. There is, however, a general feeling that the market is not likely to recede further, especially as existing prices are referred to by many of the manufacturers as actually below the cost of production. In the competition which exists the usual differential between manufacturers' and jobbers' brands is not in all cases adhered to, and manufacturers are in some cases selling their own brands at figures that closely approximate prices of special brands. This is done largely on account of their desire to market their own goods and to discourage as much as possible the sale of special brands.

**Shovels and Spades.**—There is a large volume of business in Shovels and Spades and the manufacturers generally have experienced some difficulty in making deliveries on account of scarcity of material and handles. There is, however, less complaint on this account now than a few weeks ago. The volume of business is such as to tax the capacity of the factories to the utmost, especially as there is also something of a scarcity of labor. Manufacturers whether in the association or out of it agree in referring to existing prices as being unpleasantly near actual cost of the goods. Reports from some of the independent manufacturers indicate that they are succeeding in marketing their product at prices very closely approximate to those of the association.

**Wire Rope.**—The following revised quotations on Wire Rope to consumers have been announced by the manufacturers, the discounts applying to list, July 1, 1899:

	Discount.
Iron, Bright.....	40 and 2½ %
Iron, Galvanized, add 10 per cent. to list....	35 and 2½ %

**Lead Pipe, Sheet Lead, &c.**—Under date of April 27 a reduction is announced in the prices of Lead Pipe, Sheet Lead, &c. The new prices are as follows, subject to a discount to the trade of 20 per cent., and 1 per cent. discount for cash in 10 days:

Lead Pipe, per pound.....	6¾c.
Sheet Lead, per pound.....	7¾c.
Tin Lined Lead Pipe, per pound.....	12¼c.

**Cordage.**—Owing to an advance in the cost of fibers the Rope market is stiffer, resulting in a smaller range in prices. Demand is good and card quotations are as follows, on the basis of 7-16 inch and larger: Sisal, according to quality, 9½ to 10 cents; Manila, on the same basis, 11½ cents per pound.

**Paris Green.**—There is little or no demand at present, but it is anticipated that continued warm weather will result in an increase in requirements. Quotations are as follows:

Less than 1 ton.	Per lb.
Arsenic kegs or casks.....	13¾c.
Kegs, 100 to 175 pounds.....	14c.
Kits, 14, 28, 56 pounds.....	15c.
Paper boxes, 2 to 5 pounds.....	15c.
Paper boxes, 1 pound.....	15½c.
Paper boxes, ½ pound.....	16c.
Paper boxes, ¼ pound.....	17c.
One to 5 tons, 1 cent per pound less; 5 tons and over, 1½ cents per pound less.	

**Oils.**—*Linseed Oil.*—The market is very dull and quiet. New business is light; specifications on contracts are not coming in freely, so that oil is accumulating in tanks. In view of these conditions it is understood that some of the Oil mills have closed down. The Seed market is weak and large consumers are not placing orders for Oil. City Raw is quoted at 44 cents per gallon, in lots of five barrels or more, and out of town Raw at 42 cents in like quantities.

**Spirits Turpentine.**—Owing to the freer arrival of the new crop at Savannah and lack of demand, coupled with an impression among the trade that the price of Turpentine will be lower this year, the market has been weak. Stronger reports from the South caused prices to advance at this point, but not to reach last week's prices. Quotations, according to quantity, are as follows: Southern, 49½ to 50 cents; machine made barrels, 50 to 50½ cents per gallon.

## WISCONSIN RETAIL HARDWARE ASSOCIATION.

SINCE January 1 the Wisconsin Retail Hardware Association, whose efficient secretary is C. A. Peck of Berlin, has made the material additions to its membership which are noted below. This handsome increase in the roll of members is a tribute alike to the effective work of the association and the energy and ability of its officers:

L. P. Ashley, Pardeeville.	J. Kaiser & Son, Muscoda.
Jno. R. Arndt, Elkhart Lake.	Chas. Kieselhorst, Fond du Lac.
Anderson & Liebe, Stoughton.	A. H. Kleberg, Nekoosa.
E. C. Alsmeyer, Cottage Grove.	Fred. Lanz, Monroe.
C. G. Balhorn, Welcome.	N. H. Leclerc, Waukesha.
F. J. Breylinger, Monticello.	C. V. Mashek, Keweenaw.
Boehm Bros., Durand.	J. W. Metcalf, Benton.
Biechl Bros., Beaver Dam.	Henry Miller, London.
C. D. Bremer, Milwaukee.	H. G. Miller, Fox Lake.
Bard & Holtz, Wild Rose.	H. C. Norris, Elkhorn.
D. E. Brack, Meridian.	E. H. Peshak & Co., Sun Prairie.
M. R. Broeckler, Campbellsport.	Pelton Bros., Dallas.
J. O. Caves, Westfield.	Roach Bros., Fennimore.
Byron Dexter, Cambria.	Rusch & Hirth, Fond du Lac.
P. M. Ellingson, Stoughton.	G. Ratzack, Oshkosh.
A. L. Endlich, Allenton.	Shepard & Wieland, Bayfield.
Jno. Ferdenherdt, Milwaukee.	C. H. Sheldon & Co., Thorpe.
Jno. Gill & Son, New Lisbon.	W. F. Sargeant, Bayfield.
Gullicksen Bros., Iola.	Schuler & Laurens, Depere.
Hansen Bros., Scandinavia.	H. Volkman, Kingston.
H. J. Hendricksen, Argyle.	W. W. Walsey, Sauk City.
Johnson, Hill & Co., Grand Rapids.	J. B. Weinsick, Plymouth.
J. W. Johnson & Son, Neshkora.	Wooster & Jones, Wautoma.
H. Johnson, Deerfield.	Ziemen & Bruestwich, Fall Creek.
Chas. Kinder, Viola.	

Legislation is now pending through which the association hopes to be able to organize a State Hardware Dealers' Insurance Company.

## MARKETING BUILDERS' HARDWARE.

THERE has of late been more or less conference between some of the prominent manufacturers of Builders' Hardware, with a view to correcting some of the practices which have been in vogue in connection with the sale of Hardware for large contracts. Some of these abuses are regarded as involving a good deal of hardship to the manufacturers. For years it has been the custom for dealers to submit to the manufacturers specifications, and the manufacturer has been compelled to do the clerical work at his own expense, giving the merchant a lump sum upon which to bid for the contract. Hereafter the plan is to refuse to furnish such lump quotations, except at a higher price. Dealers who are sufficiently familiar with the Hardware business to figure out their own bills will thus reap an advantage, as this arrangement will not apply to them. Those dealers, however, who are unable to make the calculations will be expected to pay an additional price to cover the cost of time and labor to the manufacturer on this account. The carrying out of this arrangement, it is said, will be left with a representative of the manufacturers who are parties to it, who will exercise supervision over the business, so far as concerns this matter.

## CARE IN PACKING GOODS.

IN ORDER to insure the receipt by their customers of goods in the best condition the Norvell-Shapleigh Hardware Company, St. Louis, Mo., have adopted a system which seems admirably adapted to secure the desired result. In each case of goods shipped a notice is inclosed to the following effect:

### NOTICE.

*If any soiled, damaged or shop worn goods are packed in this box you will confer a favor if you will kindly mail this card direct to me with full particulars.*

*J. Norvell.*

PRESIDENT

Norvell-Shapleigh Hardware Company,  
St. Louis.

(Over)

On the back particulars are printed as to the name of the packer and the date, together with the packer's instructions, as follows:

These goods were packed

Date, \_\_\_\_\_

Name of packer \_\_\_\_\_

### PACKERS' INSTRUCTIONS.

*Packers are instructed NEVER to pack any soiled, damaged or shop worn goods, nor to pack any boxes that are in bad condition. If such goods are given you to pack see the manager of your department.*

Norvell-Shapleigh Hardware Company.

(Over)

By this system it will be seen that packers are given strict injunctions never to pack damaged goods or boxes in bad condition; the customer is informed as to the desire of the house to have the goods reach him in good condition; the making of a complaint is facilitated as the blank may be returned to the president, while at the same time the responsibility for any neglect in the matter is definitely placed.



## SALESMEN AND EXPENSE ACCOUNT.

BY FRED B. ELLSWORTH.

**A**MONG the requisites essential to being a successful salesman and a predominant factor is the confidence a salesman inspires. In fact, I have come to the conclusion that the greater the confidence placed in him the greater will be his success in life. Tracing this characteristic still further, should there not only be confidence between a salesman and buyer, but implicit confidence in a salesman by his employer as well?

The methods that many employers pursue in handling their salesmen, however, are not only irrational but inconsistent with sound business principles, and not only tend to show lack of confidence in a salesman's integrity, but oftentimes make him untrustworthy. I refer now to the expense account, which many salesmen are compelled to keep.

I can easily comprehend when a large institution, employing a great many salesmen, distributed over different territories, find it necessary to have some system of keeping expense accounts, but the simpler they are, with the fewest possible details involved, the better off they will be. I have seen expense books carried by salesmen that would make a liar and a thief out of a minister. They contained a lot of unnecessary details, and such a lot of red tape that the salesman who carried it should have been a bookkeeper instead. For instance, one expense account I saw recently was itemized as follows:

Hotel, railway fare, 'bus or car fare, mileage book, cigars, drinks, shave, bath, shoes shined, tips, &c., to be itemized each day and footed up at the end of the week and sent in to be passed upon before an expense check was forthcoming. Such a system is as absurd as it is ludicrous. Outside of the hotel and railroad fare the rest was inconsequent, and was simply incidental and of no particular importance that I can see, unless it was the shave and the bath item, so that the firm knew to a dead certainty that their salesman kept clean. With this was a form sheet, which requested the names of those called upon. If sold, how much? If not, why not? and other miscellaneous information.

A salesman is employed to sell goods. He must have come to you well recommended with a reputation as a good salesman, a man of ability, honesty and integrity, or why is he with you? He goes out on the road to sell your product to the very best of his ability, to look after your interests, to communicate to you such information as is necessary to the interests of your business. It is understood, if you are a house with a reputation for fair dealing, that your salesman is to travel economically, consistent with comfort and good living, not necessarily extravagant. You desire that he stop at a first-class hotel, and let me say right here that the standing and importance of a house is often judged by the sort of a hotel that their salesman patronizes. If necessary, you expect him to entertain your customers, and he does this when he thinks it is profitable, and often does it as a matter of courtesy.

You know full well, if you know anything at all about business, just about what it costs a man to travel. Such being the case, why make a bookkeeper out of your salesman? If your salesman feels that you have implicit confidence in him in every way, mark my word for it, he will do everything in his power to retain it, and not for the sake of a few dollars which he might be able to charge up against you will he betray it.

Within the last few years the first-class hotels throughout the country in the larger cities have done away with the American plan of living, and now as a rule they are all run on the European plan. This has increased very materially the cost of traveling. Previous to this change the average rate per day on the American plan was from \$3 per day upward, and \$3.50 per day with a bath and upward, according to the location of the room and not considering sample rooms, which of course invariably come higher. Since the change to the European plan the rate per day for a room is \$1.50 per day and up-

ward, \$2 for room with bath and upward, and more often than not the \$1.50 room, if to be had at all, is undesirable. Meals are all *à la carte*, with sometimes a *table d'hôte* dinner at night. This has almost doubled the cost of traveling as formerly.

Many people labor under the hallucination that traveling on the road is such a pleasant, envious occupation that for the most part a salesman's duties consist of riding around on comfortable Pullmans, stopping at fine hotels and wearing good clothes. To be sure salesmen, good ones, draw large salaries, but no salary was ever large enough to compensate a salesman for what he goes through or has to contend with on the road.

Leaving out the matter of ability required to be a successful salesman, I think that one principal characteristic is also to have a constitution of iron and the digestion of an ostrich. Different climates through which he passes, the variety of foods he eats, and beds he sleeps on, are things few people take into consideration.

The life of a salesman is no bed of roses. Sometimes he is gone from home for weeks and months, so that on his return he has to be introduced to his family. Consider these things. Respect your salesman, have confidence in him. Make him feel that your interests are his interests, and *vice versa*, and with that mutual feeling of regard, it will not be necessary for you to load him down with expense book accounts such as I have mentioned, or necessitate his being an expert accountant in order to hold his position.

## THE TRAVELING SALESMAN'S INTEREST IN HIS HOUSE.

**T**HE following letter from one of the leading houses in the South emphasizes the fact that the salesman's interest is primarily with his house rather than with his customers, and that loyalty to his employer should characterize all his transactions:

There is one point that we persistently try to impress on our salesmen, and that is that our interests are mutual and that our interests cannot be separated, and whenever they do anything that hurts the house it must eventually also hurt them. We find this at times a difficult matter, as so many salesmen are disposed to take a narrow view and try to work for themselves and customers, instead of trying to work for the interests of all. The salesman is a medium, or, we might say, a balance scale, between the buyer and the seller, and it is a wise salesman who can adjust the balance so nicely that both the buyer and seller are pleased. The man who does this is the highest type of salesman, and the man who fails in this must inevitably fail all around, and if it comes to a question as to whether a salesman would rather please the customer at the expense of displeasing his house, he should not hesitate a minute to displease the customer, for there are many customers, and it may be there is only one house for him. In serving one house for 23 years in the same territory I tried to make this point quite clear to my customers. I wanted to keep them, but above all I wanted to keep my house. I would present this argument whenever they insisted on making a price that did not give my house profit.

P. & F. CORBIN, New Britain, Conn., have on exhibition at their New York branch, 15 Murray street, an old English lock which guarded the Prescott Gate to the lower town of Quebec for 100 years. It is heavy and cumbersome, but simple in mechanism. The lock weighs 21½ pounds and the key 18 ounces, the latter being about 10 inches long. For purposes of comparison there is displayed in the same front window a Corbin Unit Lock Set, weighing complete but 5½ pounds, the key to which weighs but ½ ounce. This exhibit graphically emphasizes the great improvement in security and finish accomplished in Locks since Locks of wrought iron were hand forged.

HARDWARE FACTORY  
COST METHODS.

THE following paper by E. E. Brown of E. E. Brown & Co., Philadelphia, was presented at a recent meeting of the Sash Weight manufacturers, and discusses a practical method without undue complication of ascertaining and recording the cost of Sash Weights. The methods described and the principles laid down will undoubtedly be suggestive to manufacturers in other lines. The blanks are not filled out so as to represent actual costs in this particular department, but simply with a view to illustrating the methods employed.

METHOD OF RECORDING  
COST OF SASH WEIGHTS.

The cost of manufacturing and marketing Sash Weights is a subject that is a closed book to many of us, and very imperfectly understood by all. One of the provisions of the bill to regulate trusts which Senator Hoar introduced in the United States Senate provided that it should be unlawful to sell goods at less than

MOULDER'S BLANK.			
Name of molders	Description of pattern	7 1/2 flat	
Gallagher	Number of moulds	106	
	Number of castings moulded	424	
	good	420	
	lost	4	
	Loss	30 lbs. 009 & in weight	

Molders' Blank.

cost, when done for the purpose of ruining a competitor, and as this or some similar measure is sure to become a law it is most imperative that we know costs. Good business management demands it, the law will soon compel it, therefore it behooves us to master the subject. I would recommend the enactment of a law as an amendment to the National Bankrupt

Penalty for Selling  
Below Cost

law, whereby criminal prosecution and individual liability should follow every failure due to selling goods at less than cost. This would be very drastic, but it would settle at once the greatest evil every business man has to contend with, our cheap standard of credit would be raised, and the trust bugaboo would be buried with George Washington's little hatchet and William Tell's apple. It is the fear of the law and not our conscience which keeps most of us in the "straight and narrow path," and if we can get the proper laws passed there will be inaugurated that era of good times and good fellowship which has been promised us under the name of the millennium.

- I. How Shall We Arrive at Cost?
- II. What Items Enter Into Cost?

Cost must be computed for three periods of time, and we must also know the cost of each class of castings, therefore we will take up each of the following headings in detail:

- First. The daily cost.
  - Second. The average monthly cost.
  - Third. The average yearly cost.
  - Fourth. The cost of each class of castings.
- The daily cost is the most important and shows the

greatest variation, which will show a difference in cost from day to day of from 10 cents to \$3 per ton. To those who are not in the habit of keeping a daily cost this may seem a surprising statement, but when you consider some of these causes it is more easy to explain than it is to find a remedy. Some of the causes are: Molders out; incompetent molders; poor coke; a poor grade of metal. To illustrate these in their order, we have:

I. **MOLDERS OUT.**—Assuming a foundryman has 20 molders at work and that it requires the output of 16 to pay the cost of the day's running and that the profits must be derived from the work of four molders, if one of these molders is out the profits are reduced 25 per cent. The daily report will show this as an increase in cost, as the following example will show: Suppose each molder produces 1 ton of good castings and receives in wages \$2.50. If one molder turns out 1 ton, 20 molders will turn out 20 tons. We will say, for example, that 20 tons are produced at a cost of \$500, or \$25 per ton. If one molder is off the expense of the day is reduced by the molder's wages, \$2.50, and the fuel and metal, which we will say amounts to \$9.50, or a total of \$12. We now have 19 tons of castings produced at a cost of \$488, which is \$25.16 per ton, an increase of cost per ton of 16 cents and an increase in cost for the day of \$3.04. If two molders are out the cost has increased to \$26.44 per ton, or \$25.92 per day; and if four molders are out the cost has been increased \$2.25 per ton, or \$36 per day.

II. **INCOMPETENT MOLDERS.**—The percentage of loss in castings from incompetent molders is increased, and the cost of chipping and grinding and apologizing to the customer is increased as well. The loss in castings may equal the output of one molder, and the delay and bad work has frequently resulted in the loss of a customer.

III. **POOR COKE** results in an increased consumption of fuel, a slow melt and great profanity.

IV. **A POOR GRADE OF METAL.**—It is as difficult for a Sash Weight cupola to reduce an oxide of iron as it was for the camel of old to pass through the eye of a needle, yet we at times put a "rust" into the cupola and then wonder why it is that after having charged 4 tons we have only 2 tons melted. The cost is increased by metal lost in melting, extra fuel used, wear and tear of cupola, and sometimes increase of wages as overtime.

The daily cost is the most important and difficult to compute. There are certain expenses that are fairly constant, such as insurance, interest on investment, rents, telephone, taxes, power, teaming, repairs, car service, pattern and flask, fire brick, sand, core and facing material, tools, &c. By getting the total cost of these items

Daily Cost

for one year and dividing by 300, the average number of working days in a year, it would give the amount to be charged to each day. To this add the daily cost of wages, fuel and metal, and divide by the number of tons produced that day, which will give the cost per ton, but does not give the cost per ton of each kind of casting, such as Regular Weights, Special Weights, Grate Bars, Elevator Weights or Washers; neither does it give the cost for the day we shut down for repairs, or for a new horse to replace the one that died, or the new set of flasks which have to be made.

The average monthly cost will be fairly constant as to corresponding months from year to year, but will differ with the months of the same year. The extremes

Monthly and  
Yearly Cost

of heat and cold, the number of days shut down for repairs, busy and slack seasons are factors that influence cost. The average yearly cost is the least important of all, although it may be the most accurate. It is only important as it gives the base price. The causes of change from year to year are the changes in price of labor, metal and fuel.



To determine the cost of each kind of casting requires very careful and systematic work. For example, we will say that a molder can make 20 castings a day from a pattern which requires core setting, and that the casting only weighs 20 pounds; this would equal 400 pounds for the molder's day's work at a cost of

Wages .....	\$2.50
Cores, facing, fixing flasks, &c. ....	1.50
	<b>\$4.00</b>

This is equal to 1 cent per pound.

We will assume that the average cost per pound for that day, less the amount charged to this molder, is  $1\frac{1}{2}$  cents per pound. The cost per pound for this casting would be: Cost of iron delivered to molder,  $1\frac{1}{2}$  cents per pound; extra work on casting, 1 cent per pound, making a total of  $2\frac{1}{2}$  cents per pound, or \$42.50 per ton. This is the class of work for which the average foundryman charges 2 cents per pound and imagines he is getting a profit.

It is very much like the story of the peanut woman telling her business troubles to the apple woman. After speaking of the glory of other days, when there was profit of 1 cent a glass on peanuts, she said, "But that is all changed now, Mrs. Apple, and I lose on every glass of peanuts I sell." Mrs. Apple was one of those old fashioned women who did not understand modern business theories, and she said, "But how in the world do you stay in business if you lose on every glass of peanuts you sell?" The up to date Mrs. Peanut replied, "Oh, I sell so many of 'em."

The National Foundrymen's Association has laid down the law that "the cost of any casting would be the cost of that casting if the whole shop were working on it," therefore we must know the cost of every kind of castings. It has happened to me in times of severe competition that I lost money on regular weights and had but a very small margin of profit on specials.

How should we arrive at the cost of each kind of castings? According to the laws of good business, and the contemplated anti-trust laws, we must not sell any

of our goods at less than cost, therefore we must know the cost of each article. I would suggest for this that we have printed forms which shall be so comprehensive that every item will be included, and that among

DAILY COST.	
Wages	\$62.06
Metal	74.00
Fuel	13.56
Fixed charges	48.00
Total	197.62
Divide by number of tons of good castings to get the cost by ton	\$ 240.50

Daily Cost.

the blanks we have one which shall be known as "Fixed, Charges" and shall consist of a summary of all that should be charged to that heat, and could be set down

under the following heads: FIXED CHARGES; WAGES; METAL; FUEL.

The FIXED CHARGES would remain the same throughout the year and would be determined by taking the total debits of all accounts which are charged to profit and loss account when closing the books at the end of the year (excepting raw material, fuel and wages), and dividing by 300. This would give the amount to be charged to each day.

If this association teaches its members the importance of knowing cost and how to arrive at it it will not only have justified its existence, but be immortalized and deserve to rank with the great and good of history. It will also have accomplished a great moral good by stop-

CUPOLA BLANK.							
Metal Charged							
Grade of Metal	Pounds	Price	Cost	Fuel and Compound	Pounds	\$	Cost
Scrap, Gates	2240	—	—	Coal	1120	5-	2.50
Burnt Iron	2240	8-	8.00	Coke	2000	8-	8.00
Cupola Shot	2240	7-	7.00	Compound	613	10-	3.05
Mixed Borings	6720	9-	27.00				
Iron Scrap	8960	8-	32.00				
Total	22400		74.00	Total	3733		13.55
Ratio of fuel to metal charged				1 to 6			
Ratio of fuel to good castings				1 to 4.3			
Loss in melting				3360 lbs. 15%			
Cost of metal and fuel per ton of good castings				\$10.85-			
Good Castings, pounds				16128 Blast on 2.30			
Bad Castings, pounds				672 Bottom dropped 5.30			
Gates, Scrap, pounds				2240			
Total amount melted				19040			
Total cost of wages, moulding, metal and fuel per ton—good castings				\$ 18.50			
Remarks							

Cupola Blank.

ping much of the damage done to that ancient commandment, which says "Thou shalt not lie"—even about the cost of making Sash Weights.

## METHOD OF ESTIMATING GENERAL EXPENSES.

From a New England Manufacturer: Nearly all of the letters you have published on "Factory Costs" are very interesting and instructive, and show that the evil of underestimating is widespread. It is to be hoped that the manufacturers, who most need light on this subject, will profit by the experience of those who have had the scales removed from their eyes.

Many small and medium sized factories have been, and will be, started by mechanics who have decided beforehand that the line into which they go or are going must be profitable. They are good mechanics, but of the art of merchandising they know little or nothing. They invariably enter the market on price, not quality, and such prices as they make are not based on a comprehensive idea of cost. Price cutting is a disease often born of lack of knowledge of costs, and when so created is seldom curable. Such concerns exist, saving—not making—money one year, losing a little the next; the third perhaps a specialty or special job or a combina-

tion or pool helps out, and so on until dry rot sets in and it crumbles, to reorganize or disappear, and yet it is safe to venture the assertion that in all the years of their existence their selling prices will show a good profit above their estimated costs.

If a manufacturer does not deem it advisable to install a special department for systematizing his costs the only thing that remains for him is to be on the safe side. A method which, though not perfect by any means, but

one that will be found safe, is to take **Rule for Charging the actual manufacturing expense, in Expense** plus cost of material plus a fair charge for use of tools and machinery; then, taking a fair average year's sales, ascertain therefrom, by the amount of merchandise bought and pay roll, how much should be added to the net cost as above to be safe.

For instance, suppose sales for 1902 to be \$300,000:

Merchandise bought.....	\$110,000	
Deduct not used in goods.....	20,000	\$90,000
Pay roll.....	\$120,000	
Deduct foremen, laborers, all nonproductive factory help and loading.....	30,000	90,000
		\$180,000

All outgo other than merchandise and pay roll—namely, taxes, repairs, insurance, interest account, salaried help, &c., and, say, 5 per cent. on capital invested, amounts to \$45,000; this would necessitate 25 per cent. being added to \$180,000. The actual dead costs, to be safe..... 45,000

Total estimated cost..... \$225,000

On this basis, if the sales exceed \$300,000 the 25 per cent. added is still safe, and if the increase

**Changing Percentage** is healthy and not spasmodic and the outgo not increased, this percentage can be reduced. If the business falls below \$300,000 and the outgo is not reduced the percentage must be increased.

Few manufacturers realize the folly of increasing the variety of their output rather than the quantity, and the corresponding expense of nonproductive mechanics, the waste of time changing from one style or pattern to another, the extra amount of money tied up in stock and the extra expense the added detail causes in handling and marketing. Take a given tool and show

**Increasing Variety** it to ten mechanics and one will get five different opinions of it. A composite tool can quite likely be made, embodying these five different opinions, and the entire ten satisfied. It follows that ten workmen can make one kind of tool to better advantage than one can make ten kinds.

Too many manufacturers believe that the wonder is in the next county; that his neighbor can produce cheaper than he. It is seldom so, quality for quality. The wonder will generally be in the next county, no matter how fast one travels to catch him.

## REQUESTS FOR CATALOGUES, &c.

*The trade are given an opportunity in this column to request from manufacturers price-lists, catalogues, quotations, &c., relating to general lines of goods.*

Andrews Hardware Company have purchased the stock of Shelf Hardware, Stoves, Tinware, Sporting Goods, Paints, Oils, &c., of Hines & Gherney, North Bend, Neb., and will continue at the old stand.

Geo. Gishpert has bought the Hardware, Stove, Farm Implement and Sporting Goods business of J. P. Kuble, at Pierce, Neb.

Among the sufferers by the conflagration in Columbus, Ohio, on the 26th inst., were the Tallmadge Hardware Company, who were completely burned out. The company are desirous of receiving copies of catalogues and price-lists from manufacturers.

The Ingram Hardware Company, Oakland, Cal., are building a branch store at Emeryville. The building will have a 40-foot frontage and a depth of 60 feet. It will have a fine plate glass front.

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## BRITISH LETTER.

Offices of *The Iron Age*, HASTINGS HOUSE,  
NORFOLK ST., LONDON, W. C., April 18, 1903.

### The Week's Hardware Trade.

THE Easter vacation only concluded on Wednesday of this week, and, as a matter of fact, some shops do not open till next Monday. No special comments are needed. Trade is fair to middling. In the Cutlery trade business is quiet. From America have come increased inquiries for Butchers' Knives and Steels, Shoemakers' Knives and other specialties. The South African demand for Cutlery develops slowly, but an increasing trade is being done. The Sheffield industries have been much affected by the Australian drought, and it is hoped that the period of depression is past. With Canada Sheffield Cutlery houses have been doing an increased trade, and there are fair orders on the books.

The renewed weakness in the Copper market has led to a weakening of orders for Sheets and Tubes, but the demand for Copper Wire for electrical purposes is brisk, and Brass Tubes are selling well. In the general brass foundry branches trade is only moderate, the demand being mainly for cheap machine made goods. In this connection American competition is being severely felt in neutral markets. The cheapness of American Tubes, in spite of the much higher cost of material and labor in your country, is judged over here to be due to the marked superiority of American machinery and the American drawing process, enabling your mills to turn out in a given time three times the quantity of Tubes which can be produced here. Some leading British Tube makers are now laying down American plant, but great difficulty is found in obtaining the necessary skilled labor, which has to be imported from the United States. There is an improved demand for Builders' Ironmongery. Up till recently I reported a number of times that the demand for Locks was for the better qualities. There is now a change; during the last few weeks for the better classes of Locks there has been only a moderate inquiry, but makers of the commoner grades are busy on orders which could not be executed during the strike. The sale of enameled advertisement plates is just as heavy now as it has been any time during the last two years. Several times I have urged that American manufacturers should tackle this trade. There is money in it.

### An English View of American Cutlery Manufacture.

The Mosely Industrial Commission, consisting of a number of prominent British trade union workmen, who visited your country recently, have now issued their joint report. The workmen engaged in the iron and steel departments numbered eight, covering the blast furnace, iron foundry, engineering, boiler making, shipbuilding, shipwrights and tubes. Those interested in Hardware and Cutlery may be glad to have some excerpts from the report of Robert Holmshaw of the Sheffield Cutlery Council. Coming from the very heart of the Cutlery industry, his comments upon what he saw in America are valuable and suggestive. Space precludes presenting the report in full, but the following extracts are worth putting on record:

#### Commodious Factories.

The workshops I saw were, with few exceptions, very good; being large, well lighted and heated by steam pipes. This is not the case in Sheffield, where the open fire place has to be relied on for warmth, and only succeeds in warming that part of the workshop nearest to it. One point that struck me in the Cutlery manufacture in America, and which, to my thinking, contrasts favorably with our system in Sheffield, is that there is no outworking. All parts of the work are done in the factory, and this saves the great loss of time which must take place where outworking is practiced. Factory management is far better in America than in Sheffield. Every attention is given to the comfort and convenience of the men, with the result that the great waste of time so common in our own town is there unknown. In an American factory a good stock of the raw materials used in manufacturing is kept ready for use, such as Blades, Handles, Scales, Springs and all other parts required in the making of a Knife. This means that there is no unnecessary waste of time, as is the case where a man, on receiving an order, has to repair to various parts of the factory, and perhaps to some distant factory, to secure the requi-

sites for his work. This saving of workmen's time is noticeable all over the factory. The employers' object is to turn out as much work as possible, and he knows that the best way to accomplish this is to make the work people as comfortable as possible and place every means for rapid working at their disposal, with the result that the men can earn good wages under good conditions and the employer is sure of an increased output. There were certainly some work shops I visited in America whose conditions are much below the general standard, but even here the same system of preparedness was noticeable. In Sheffield, so far as I know, only one firm have the same methodical time saving system.

### American Workmen More Temperate.

It is undoubtedly true that there is less drinking among American workmen than we find among our own. This applies not only to native Americans, but to Englishmen settled in America, who speedily fall into the accepted customs of the country. The workmen in the States commence work in the morning to time, and work steadily through the day. The Sheffield workman works harder than the American, and, of course, is in many cases equally sober; but it cannot be denied that there are many instances where the fatal drinking habits result in great waste of time and consequent annoyance to the employer. The cause and remedy for this are, perhaps, the most serious questions that could engage the attention of the Sheffield manufacturer. Personally, I believe—especially after this brief glance at American workshops—that some of our obsolete customs of workshop management are at the root of this deplorable state of things. Enforced loss of men's time for trivial causes, through no fault of their own, too often gives the opportunity for leaving work which would otherwise not be sought.

### Prevalence of Machinery.

There is a much more extensive use of machinery in the States than in Sheffield for Cutlery purposes. All Table Blades are forged by steam hammers or cut out of sheet steel, "fired." All boring is done by machinery, and the holes required are made by one operation. Spring Knife Blades are forged by some firms, but in all cases by Sheffield men; the greater proportion, however, are pressed by machinery. Grinding Machines are in use in some of the factories, but only to a very small extent, and then only to do common work. Spring Knives are made on the same principle as in Sheffield, with the exception that all boring is done for the men. Grinding of Spring Knives is largely in the hands of Sheffield men, and is done in Sheffield ways. America makes no fine Scissors, but makes some Shears of malleable iron and some steel lined. The common work is ground on Emery Wheels, and the better work seems to be ground largely on the German principle—that is, the workman sits in front of the stone, and by the aid of a large flat stick presses the blade to the stone with his knees. The labor is divided, one set of men grinding and others finishing. Bows are dressed by men on a belt. Sheffield steel is largely used in the manufacture of the best Cutlery, the reason given to me why American steel is not used being that its temper varies so much, while the temper of English steel is more even.

### Workroom Customs of England and America Compared.

Tools and workroom are provided for all classes of workers, with the exception that in some cases the cutlers have to provide their own files. This is strikingly opposite to Sheffield custom, where the grinder and cutler not only provide their own tools, but pay rent for room and power in their employer's own factory. The result of the American system is obvious. It is to the employer's advantage to keep his men well supplied with work, otherwise his machinery is running at a loss. In Sheffield, whether the workman has sufficient work or not, the rent must be paid, and there is consequently not the same incentive to find regular and continuous employment for the men. It will readily be seen that there are times when this system is the cause of great loss to the men. A ten-hour day is the rule in America, with a Saturday half holiday from April to September. Wages are higher than in Sheffield, generally about 100 per cent. In the silver and allied trades there is great division of labor. A man does not begin and finish an article as with us, but is engaged on a special part, the article itself going through several hands. Machinery is largely used in this branch of trade. The greatest novelty that I saw was a die-sinking machine, which appeared to require little attention. Another interesting little machine was used for straightening Wire. Burnishing is done by men with the same tools as are here used by women.

### Apprenticeship System.

The apprenticeship system of America is very different from the English one, and no doubt the chief reason for

the difference is to be found in the exceptional chances American employers have of filling their workshops with trained men from England and the Continent. There is not the same eagerness to apprentice lads as with us. In one large silver factory I visited they had not a boy under the age of 18. The manager told me lads were more bother than they were worth. In a Razor grinding shop where 30 men were employed there were only two boys. The same scarcity of apprentices struck me in all the shops. The long apprenticeship system of England is unknown. The American boy, on leaving school, wants to get money and plenty of it, and seldom enters any business which demands a long wait before he can command good wages. The Cutlery trade requires too many years to learn to suit the taste of the young American. At the Cash Register Works at Dayton no boy is engaged under the age of 18, when he must have taken a course at the Technical School. His time of apprenticeship then is four years—from 18 to 22. The great specializing of work in many industries makes a shorter apprenticeship possible, but on all hands I heard that the British-trained workman is the best in the States, even when working on the American plan.

#### Specific Questions and Answers.

At the end of each individual report a number of specific questions were put to the delegates, which they were requested to answer. These answers are in many ways of greater value than the more general comments from which I have quoted. I regret that I cannot give all the answers to the various questions, but the following are useful because they convey comparisons as between the American practice and that obtaining in Sheffield.

Q. Does the American workman do more or less in an hour, on average, than the English workman?

A. The American workman does not actually work harder than the English workman in an hour, yet his output in certain branches of the cutlery trade is greater, because of the improved conditions under which he works.

Q. Are suggestions for improvements made by the employers, the introduction of labor saving appliances and up-to-date machines, welcomed by the men, or the reverse?

A. Labor saving appliances and up-to-date machines are welcomed by the men, because, while lightening the work, they do not mean the reduction of wages.

Q. When skilled workers on piecework increase the output per man by their own efficiency, do American employers cut down wages so as to prevent a man earning more than a certain amount?

A. In the Cutlery trades I heard no complaint of this practice, but in the Britannia Metal trade I was informed in one factory that it was the custom for the employer either to cut down prices or to put the workman on day work at a lower rate than he had earned on piecework.

Q. Does the American workman exert himself at times of special pressure, and at such times do overwork cheerfully? How does this overtime output compare with the output of the normal day, and how does he in these respects compare with the English workman?

A. In the silver and allied trades of America there is a great deal of overtime made—generally just before Christmas, when much of this class of work is needed for Christmas presents. Under the present system the men have to work if required, and the element of cheerfulness does not come in. In November the overtime in Meriden in the above trades was averaging about three hours a day. The output per hour of overtime in these trades is the same as the output in the normal day. In Sheffield there is not much overtime worked either in the Cutlery or silver trade; when it is worked it is for a short time before Christmas—for the same reason as in America, though not to the same extent—and the same amount per hour will be done as in the normal day. Being only of comparatively short duration, however, in both countries the strain on the men is not a long-sustained one, or the answer concerning the output might be different.

Q. Speaking generally, are there greater opportunities for the workingman to rise in America than in England?

A. Yes. This may be due to the more recent growth of manufactures. It is evident that men with exceptional ability will have a greater opportunity of rising or making their mark in a new country where fresh developments are eagerly seized upon, and, as in certain cases that came under our notice, where distinct encouragement is given to the worker to think out improved methods. It was not unusual to find in many factories that such men were appointed to positions of trust and responsibility. My observations led me to conclude that such appointments are more common in America than in England.

Q. a. Do you consider American factories better equipped for production than English? b. Are they better managed, and are a greater proportion of university

trained men employed in management than is the case in England? c. Do the factories turn out better work?

A. a. Yes. There is a greater use of machinery, and no expense is spared to secure any new device that will increase the output. b. In the Cutlery trades, yes. The work is given out systematically, and no pieceworker has to waste any of his time in journeys to various parts of the factory for work, as is the case too often in Sheffield. In American factories the time of a skilled workman is too valuable for his employers to allow of its being frittered away in running about for work; hence the methodical system which sees that each man has his wants supplied by unskilled labor. Speaking generally, there seemed to be a greater proportion of trained men employed in the management than in England, and this is no doubt due to the increased facilities America has for such training. c. No. Speaking generally, English factories turn out better work than American.

Q. How far is greater output in American factories due to—*a*, longer hours of work? *b*, Greater speed at which the machinery is run?

A. To my thinking, neither of these causes accounts fairly for the increased output, which is due chiefly to the employment of better machinery, to the extensive use of labor saving appliances, and to better workshop management.

Q. Are there any points in American practice which should, in your opinion, be imitated in English factories?

A. a. Better workshop management, by which waste of time might be avoided. b. More frequent meetings between employers and employees, at which the interests of each respectively might be discussed, and individual difficulties explained and understood.

#### Birmingham and Barter.

One of the difficulties which American makers will encounter if they seek to transact business with semicivilized countries (as, for example, Central Africa), is the system of barter, which has grown up as between Birmingham manufacturers and native races. For three-quarters of a century the native races of Western Africa—Southern Nigeria in particular—have made Birmingham their mint. It is the "savage's mint," and in it tons of "Manillas," or ring money, which is a form of native currency, have been produced. This quaint trade has found regular employment for many men in the brass casting industry, and at one time the demand was sufficient to keep a small factory continually employed. During this long period the supply has been fairly regular, and so recently as last year many thousands of these peculiar money tokens were exported from the Birmingham factory to Bonny, the coast town in the Gulf of Guinea, for New and Old Calabar, and the "Oil River" districts, where, by the way, the recent serious rising among the natives has occurred. A proclamation has just been issued by Sir Ralph Denham Moor, the High Commissioner of the Protectorate of Southern Nigeria, forbidding the importation of ring money or "brass rods," another form of native currency or medium of exchange, which were manufactured chiefly at Selly Oak. This order has dealt a severe blow on the two firms engaged in this peculiar African trade. For each offence the importer is liable to a penalty of £50 and confiscation of the goods. They are to be superseded, it is said, by ordinary coinage. These "Manillas" are made of a copper alloy, and are of a peculiar shape. The body is like the upper part of a rather thick ring, about 2 inches long, and the ends suddenly turn inward, at the end of which is made a hoop or shield of uneven surface. They weigh nearly 2 ounces each, and in Nigeria are worth from 3 to 6 cents, according to pattern. They are generally the color of a penny which has been long in circulation, but there is one example, the most valuable, which is given the appearance of antiquity. The native African races are said to be very particular about the correctness of their "coins," and insist not merely on correctness of shape, weight and color, but they must "ring" to a half musical tone and allow of being broken in the hand. The slightest defect in shape, which would pass unnoticed by the ordinary Englishman, is detected by the native, whose sense of touch and perception would appear to be very acute. The "brass rods" serve precisely the same purpose as the ring money; their value to the native is regulated by the length. An ordinary portière rod would cut up into half a dozen "coins." All this curious money is dispatched from Birmingham to the big trading houses on the West African coast, and the natives proceed up



the river in canoes from the interior and barter with palm oil and nuts.

#### **Solid Brass Coffins for African Potentates.**

Perhaps the oddest of the Birmingham manufactures is that of coffins for the palm oil potentates and native chiefs in Western and Southwestern Africa. They are made of solid brass, and in the majority of cases are ordered by the chiefs themselves and used in their houses until required for their primary purpose, much after the style that we use a costly cabinet containing treasures. Many chieftains regard the coffin with as much reverence as the Chinese. The coffins are of huge dimensions, being from 7 to 8 feet long, 3 feet in depth, and are in the widest part nearly 4 feet across. The lid moves on a hinge and is always provided with at least two padlocks and keys. Sometimes the locks are fitted in the inside, which suggests that a chief may sometimes use the coffin as a bed and lock himself in. The brass is highly burnished, and in the bright sunlight gives off a dazzling glitter which appeals strongly to the native taste. The coffins are richly decorated with raised ornaments and attractively designed rods which run around the sides. The shield plate bears emblazonings, and sometimes figures symbolical of mythology or of strange religious beliefs. The general effectiveness is enhanced by a number of swan or ostrich plumes, usually in crimson or gold, arranged in sockets at intervals. A coffin will weigh anything up to 700 pounds, and, as indicated, has sufficient space for several bodies. It may be the desire of a chief that his favorite wives shall be buried with him. There is no recognized medium of currency with many of the native tribes, and trade is generally conducted by barter. The exchange usually takes the form of gold dust, elephants' tusks, palm oil and nuts and vegetable gum. Not long ago a Birmingham manufacturer received in payment for one of these remarkable coffins many thousands of monkey skins. They had to be realized in the London auction market.

#### **Birmingham Made Idols and Gods.**

For many generations idols and gods for heathen worship have been manufactured in Birmingham. That they are still made is equally true, but the output is very small. So far as Birmingham and the Midlands are concerned it is a decaying industry, and to-day orders are seldom received for gods, or rather this quaint merchandise, as makers prefer to speak of it. The trade has been gradually declining, and exhaustive inquiries tend to prove beyond a doubt that the production of these idols in Birmingham has been reduced to a minimum. They are, it is true, occasionally made by small manufacturers, but the work is generally only to small specific orders. Whether, however, the heathen idol trade generally has shown any material falling off during the last ten years I cannot say. But while vastly less business is done locally there is no gainsaying that our Continental rivals are to-day doing a larger business in this direction than ever before. It is also an outlet for the energy of the enterprising American, and quite recently a large contract was given to Philadelphia and New York houses for the manufacture of Chinese and Korean idols.

#### **Flint Guns for Barter.**

But this is not all that the Birmingham manufacturers do for the African natives. To her they are largely indebted for their arms. It is true they are common and not very effective, but having regard to the uncivilized condition of the people for whom they are intended an arrangement mutually agreed upon by Great Britain and several of the European countries who have interests in West Africa seems to be a good one. By that agreement it is made illegal to import any Guns having any form of percussion cap, the accepted "African" weapon being fitted with the antiquated flint locks, common powder being also supplied. Birmingham continues to send huge consignments of these old style Guns for the purpose of barter with the natives. Last year no fewer than 83,640 of these African barrels left the city, and during the past three years the number has reached nearly 300,000. The Guns find a ready market, among the natives of the Gold Coast and the Congo River, and are produced at prices as low as \$1.80 each,

and payment is received in kind, usually the products of the land. The barrels are made for the most part at Hales Owen, and although many of the Guns are fitted up by the Birmingham gunsmiths for the Liverpool and Bristol shipping merchants trading with West Africa, big supplies of barrels, all "proved" and bearing the mark of the Proof House, are received from the city by the gunsmiths at Liege, who make them up and sell them at prices below those of the home producer. The barrels are thoroughly sound. There is not, of course, much finish about the Guns and they not infrequently miss fire, but at short range they will do considerable damage. The barrels are much longer than those of the ordinary English Gun, and the barrel of the longest, which is called the "Buckaneer," is from 4 to 5 feet long. All the barrels have to be rammed in the old fashioned way.

#### **POPE MFG. COMPANY.**

JUDGE KIRKPATRICK of the United States Circuit Court of New Jersey, made an order April 2, 1903, to show cause why the personal property of the American Bicycle Company, through their receivers, R. Lindsay Coleman, Col. Albert A. Pope and John A. Miller, should not be sold to a company recently organized for that specific purpose. This order was made returnable April 20, and although neither stockholder or creditor put in an appearance or offered objection, the date for the return of the order was postponed one week to April 27, when there still being no objection, it was ordered, adjudged and decreed that the proposition as formulated by the Reorganization Committee of the American Bicycle Company and approved and accepted by the company's receivers, be consummated. In effect this means that a new corporation organized for this purpose and known as the Pope Mfg. Company, of which, at the proper time, Col. Albert A. Pope will be president, have secured the assets in the form of personal property represented by the American Cycle Mfg. Company, Federal Mfg. Company and the International Motor Company, which includes the principal Bicycle and Automobile and parts making plants of the late American Bicycle Company, for their bid of \$3,500,000 and the surrender of \$500,000 of receiver's certificates. The real estate concerned will be acquired later, as the law provides that that kind of property must be sold publicly after due advertisement. The management and direction of the new enterprise will be in the hands of Col. Albert A. Pope, who is a firm believer in competitive manufacture, advertising and selling. It is Colonel Pope's opinion that the American Bicycle Company failed largely through their failure to advertise, and within reasonable limits stimulate interest in cycling. As a pioneer rider and maker of Bicycles, Colonel Pope has a sentimental as well as a practical business interest in reviving the sport.

#### **SOUTHERN HARDWARE JOBBERS' ASSOCIATION.**

THE thirteenth annual meeting of the Southern Hardware Jobbers' Association will take place at Saratoga Springs, N. Y., on July 14, 15, 16 and 17. The headquarters of the association have not yet been chosen. The selection of Saratoga will doubtless bring out a large attendance of the members, and also of manufacturers, especially as the semiannual convention of the American Hardware Manufacturers' Association will be held at the same time and place, in accordance with their custom. Up to last year, when the Southern Association met at Atlantic City, they had been in the habit of meeting at some point in the South. This year they have come still further north, and it is to be hoped that the convention will be as successful as any in the past, if not actually eclipsing previous gatherings.

A. C. Raymer has lately opened up in the wholesale and retail business in Builders' Hardware, Tools and Cutlery, at 145 East Seventh street, St. Paul, Minn.

## DEATH OF CHARLES B. BEALL.

**C**HARLES B. BEALL, president of Beall Bros. and Beall Shovel Company, Alton, Ill., died Saturday, April 11, after an illness dating back about two years. Mr. Beall was born in Alton, July 13, 1843. He learned the trade of a machinist, and during the Civil War was an engineer with rank of lieutenant on the Federal monitor "Ozark." After two years' service he worked at his trade for some years and then accepted a position as engineer on a river steamer plying between Alton and St. Louis. Then for a time he engaged in the machine shop business with D. & R. Millen. While the present business was established in 1872 it was not incorporated as Beall Bros. until 1882, the concern consisting of two other members of the family in addition to Charles B. and Edmond Beall. A fire occurred three years ago, burning out their entire plant, when it was moved to the present location. The business of manufacturing Coal Miners' Tools, Shovels, &c., will be continued without interruption.

Mr. Beall was a kindly husband and father, and his family and home were his chief attraction in life, and there he was usually to be found when the day's work was done. Among associates he was an amiable, considerate friend, unobtrusive but thoroughly reliable. He is survived by a widow and eight children.

## PRICE-LISTS, CIRCULARS, &c.

**THE AMERICAN BOLT & SCREW CASE COMPANY**, Dayton, Ohio: Pamphlet illustrating Screw Cases and Revolving Cases with plain drawer fronts, for bicycle repair shops, machine shops, printing offices, &c. A locking device is arranged so that all drawers can be locked and unlocked at one time. When Cases are to be used for fine tools and other valuable articles they are provided with lock and key, so that only the person having a key has access to the drawers.

**THE DOVER MFG. COMPANY**, Canal Dover, Ohio: Illustrated catalogue and price-list, attractive in style, devoted to the company's Asbestos Sad Irons. The company are creating a demand for their goods by advertising in publications aggregating 3,000,000 circulation, these publications being read largely by women. A feature of the Irons is the interchangeable hood, and the company advocate the breaking of sets—that is, selling a woman a hood and whatever cores she may want.

**S. F. BOWSER & Co.**, Fort Wayne, Ind.: Self Measuring Oil Tanks. Descriptive pamphlets are devoted to the Bowser Self Measuring Oil Tanks, Long Distance Pumps and Tanks, Out Door Cabinets for Gasoline, Druggists' Graduate Self Measuring Oil Cabinets, &c.

**EDWARD K. TRYON, JR., & Co.**, 10-12 North Sixth street, Philadelphia, Pa.: 1903 catalogue and price-list of Bicycles, Sundries and Summer Outing Goods, covering 72 pages and showing complete assortments.

**G. W. COLE COMPANY**, 141 Broadway, New York, manufacturers of Bicycle, Sporting and Motor Vehicle Specialties, issue illustrated catalogue of this class of goods, including 3 in 1 Lubricant, a variety of Paste Lubricants and Cleaning Compounds, Toe Clips, Bicycle Holders, Repair Kits, Nipple Grips, Luggage Carriers and Baby Seats, Package Bags and Carriers. A more recent specialty is the Pace Maker Graphite Lubricant for motor vehicle and bicycle gears, bearings and chains. This is a paste of even consistency in hot or cold weather, said to never gum, harden or thicken. They also issue gratis for display a hanger card of their 3 in 1 Oil, for cleaning, polishing, lubrication and prevention of rust in connection with typewriters, bicycles, guns, sewing machines, &c.

**THE HORIZONTAL FREEZER COMPANY**, 25 Lake street, Chicago, Ill.: Catalogue and price-list illustrating Ice Cream Goods and Confectioners' Supplies.

**THE UNION BOW COMPANY**, Cleveland, Ohio: Catalogue and price-list relating to Wagon and Buggy Bows of all kinds.

**THE FLINT BUGGY COMPANY**, Flint, Mich.: Catalogue devoted to Buggies, Driving Wagons, Surries, Spring Wagons, Delivery Wagons, Sleighs, &c.

**THE J. L. CLARK HARDWARE COMPANY**, Rockford, Ill.: Illustrated booklet entitled "Little Metal Specialties of Merit." These include Flue Stoppers with different arrangements of wires, Flour Sifters and Toasters.

**THE THOMAS MFG. COMPANY**, Springfield, Ohio: Lawn Mowers. Illustrated pamphlet of the Thomas line of Lawn Mowers for 1903, showing a number of styles, among which are high and medium wheel ball bearing machines.

**THE EMERSON ELECTRIC MFG. COMPANY**, Washington avenue and Twenty-first street, St. Louis, Mo.: Emerson Electric Fans. An attractive pamphlet has been prepared, with a blank space on the front cover in which dealers' names may be placed. The pamphlet is of a size to fit into the ordinary commercial envelope, for distribution among customers.

**THE NATIONAL STOVE & ILLUMINATING COMPANY**, 909-910 New England Building, Cleveland, Ohio: Illustrated price-list No. 5, devoted to Gas Ranges, Hot Plates, Radiators, Heaters, Bunsen Burners, Mantle Burners and Curling Iron Heaters. These are all designed for the use of gas.

**A. D. HALL & SON**, 33-41 Spice street, Boston, Mass.: Hall's Standard Refrigerators. An illustrated catalogue and price-list shows these goods in a variety of styles.

**THE ACME ROAD MACHINERY COMPANY**, Frankfort, N. Y.: Catalogue No. 2, relating to Road Building Machinery, Contractors' and Township Supplies, &c.

**THE WAYNE WORKS**, Richmond, Ind.: Catalogues devoted to lines of Vehicles and Agricultural Implements.

**THE DIEHL MFG. COMPANY**, Elizabethport, N. J.: Electric Fans, Fan Motors and Motors for sewing machines and special purposes. Catalogues illustrate and describe these goods.

**THE KINGMAN FLOW COMPANY**, Peoria, Ill.: Catalogue No. 36, relating to Plows, Harrows, Planting Cultivators, &c.

**FRED. T. BROSI COMPANY**, Quincy, Ill.: Catalogue No. 4, devoted to Sheet Steel Products, Pieced Tinware and Sheet Metal Specialties. The firm are also galvanizers and japanners.

**THE PROUTY & GLASS CARRIAGE COMPANY**, Wayne, Mich.: Circular illustrating and describing a large variety of Sleighs.

**THE B. B. MFG. COMPANY**, Davenport, Iowa: Printed matter relating to the Improved Dewey Stock Fountain, Butler Steel Hand Carts, &c.

**THE MORRISON MFG. COMPANY**, Fort Madison, Iowa: Illustrated catalogue No. 5, devoted to the Morrison Plows.

**THE WHITE ENAMEL REFRIGERATOR COMPANY**, St. Paul, Minn.: Catalogue No. 5, illustrating Bohn's Patent Dry Air Siphon System of Circulation Refrigerators. These are shown in a variety of styles and sizes.

**KELLEY, MAUS & Co.**, Chicago, Ill.: Printed matter, including catalogue No. 41, iron and steel stock list for March, and standard classification book. In each of these are views of their new building, which they will occupy about July 1; also of their branch supply house and wood yards. Their new building is on West Water street, covering the entire block between Randolph and Lake streets, having a floor space of 175,000 square feet, with railroad trackage on the west side and river wharfage on the east side the entire length of the building.

**AURORA AUTOMATIC MACHINERY COMPANY**, Aurora, Ill.: sole selling agents, Brandenburg Bros. & Alliger, 103 Reade street, New York: Fifty-two page illustrated descriptive price-list of component parts for Motors, Motor Cycles and Bicycles, showing in detail the numerous parts of Bicycles and Motor Cycles.

**THE STURGES & BURN MFG. COMPANY**, Harrison and Green streets, Chicago, announce the completion of repairs to that portion of their plant which was recently destroyed by fire. The works are now in excellent condition and the company are prepared to fill orders promptly for milk cans and milk can stock.



## HIBBARD, SPENCER, BARTLETT & CO.'S NEW BUILDING.

**H**IBBARD, SPENCER, BARTLETT & CO., Chicago, are now utilizing their new building at the intersection of the Chicago River and State street for the receipt and shipment of freight, which has heretofore been

spring of sweet water flowed into the Chicago River at this point. The building is ten stories in height, not including the basement, having a total floor area of a trifle over 10 acres.

### The Foundations.

The foundations rest on 11 concrete caissons 93½ feet deep and 7½ feet in diameter, together with 2798



Fig. 1.—Looking Down Shipping Driveway.

handled at the old building on the corner of Wabash avenue and Lake street. The new building, which is 360 feet long and from 70 to 175 feet in width, is bounded on the north by the Chicago River, on the south by South

piles 50 feet in length. On these caissons and piles is laid a floor of concrete varying in thickness from 5½ to 11 feet, in which are imbedded two tiers of steel beams, each 20 inches deep, laid close together and crossing each

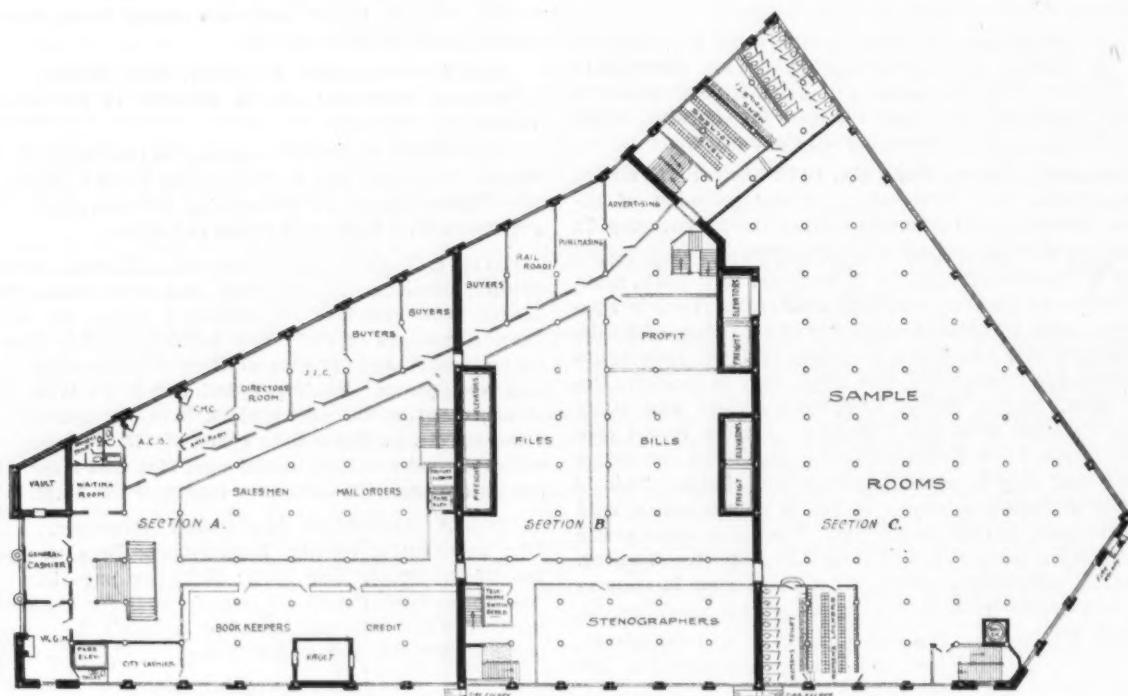


Fig. 2.—The General and Private Offices.

Water street, on the east by Dock street, and on the west by State street. The ground upon which the building is erected was formerly an Indian encampment adjacent to the historic Fort Dearborn. According to tradition, a

other at right angles. Upon this foundation are placed 248 piers, on which rest the steel and iron columns that support the structure and run up through ten stories. The total length of all these columns is 20,768 feet, and

would make a single shaft of steel nearly 4 miles in height. The wooden piles referred to would make a log 26½ miles in length. Supporting the ceiling over the driveways, shown in Fig 1, in the shipping and receiving departments are 29 steel girders, having a depth of 6 feet, 15 measuring, respectively, 37 feet and 14 meas-

operating the pneumatic tubes and an ice machine. Water is filtered, cooled to a temperature of 40 degrees, and distributed to fountains situated in different parts of the building. There are 12 electric elevators, having a capacity of from 2000 to 5000 pounds each, with a speed of 275 feet per minute, and two electric lifts running from base-



Fig. 3.—Section of Packing Room, Fourth Floor.

uring 47 feet in length, their total weight being 382 tons. According to the firm's statistician, one of these girders would make 40 kegs of Nails, or 151 miles of common Fence Wire. The total weight of steel and iron used in the construction of basement and to the ceiling of the first floor is approximately 1200 gross tons, and would

ment to shipping floor, having a capacity of 10,000 pounds each. The basement will be used for the storage of Sheet Iron, Tin Plate, Zinc, Nails, Hollow Ware and all goods known as Heavy Hardware, for the filling of orders smaller than carload lots. The latter will be shipped from the company's new warehouse on the opposite side of the



Fig. 4.—Shelf Hardware, on Fifth Floor.

make a single line of telegraph Wire 10,230 miles long, or 26,870 kegs of Nails, requiring a freight train of 67 cars to haul them. Each of these girders is capable of supporting a weight of 700 to 800 tons.

#### Equipment.

In the basement are three 125 horse-power boilers, two electric house pumps, an electric air compressor for

river. On the river front the basement opens on a dock 7 feet wide, running the entire length of the building.

#### Shipping and Receiving Departments.

The shipping room on the first floor occupies 20,000 square feet, the floor being raised 4 feet above a driveway running inside the south front of the building, and being 35 feet wide by 215 feet long, allowing 21 teams to



stand abreast and still afford ample room for teams to drive in and out of the 15 large doorways opening on the street. By this admirable arrangement shipping can be carried on irrespective of the weather without the least fear of damage to goods. The receiving department occupies the east end of the first floor, having a driveway inside the building 36 feet wide and 178 feet long, permitting the teams to unload to the floor, which is raised to the level of the truck beds, as in the shipping department.

#### Minor Offices.

On the first floor also are situated the offices of the traffic manager and the shipping and receiving departments. Near the west end of the first floor are located the offices of the jobbing and city trade, with entrances on South Water street. The main entrance, on State street, is 17 feet wide and 59 feet high, flanked on either side by stone columns and opening into a vestibule 30 x 36 feet, from which a stairway 12 feet wide leads to the general offices on the second floor.

#### General and Private Offices.

The general and private offices are located on the second floor, and are shown in Fig. 2, including the purchasing, sales, order, accounting and crediting depart-

ments, and sample room, accessible to customers and salesmen alike. At the left of the stairway landing a spacious and comfortably furnished waiting room also has been arranged for the convenience of customers and visitors.

#### Ventilating and Heating.

The building is ventilated by the Plenum method, operated by two 110-inch blowers, placed in a room on the fifth floor. The air is drawn from the outside and by an ingenious device purified, passed over heated coils to obtain the desired temperature and then pumped into the various rooms through numerous registers.

#### Fire Proof Furniture.

Not only is the entire building fire proof, but all of the desks, partitions and furniture of the general offices, where the most valuable books and documents will be kept, are of steel. This metal furniture is finished to resemble mahogany. The floors of the offices are covered by a fire proof substance known as asbestolith.

The building is equipped with telephone and pneumatic tube systems, a telephone exchange and 70 stations being located throughout the house.

#### Location of Departments.

The floors of the building, from the third to tenth, inclusive, will be utilized as follows: Third, Gun, Cutlery and sample goods; fourth, packing room, a section of

### THE PARAUPTIC BANK LOCK.

THE HARDWARE CLUB is the recipient of one of the famous Parauptic Bank Locks, the gift of Henry R. Towne, president of the Yale & Towne Mfg. Company. It has been appropriately mounted on a bit of rich mahogany to properly display it and makes an interesting addition to the club's curios. The name Parauptic is from the Greek, signifying concealed from view.

The history of this Lock is most interesting, it having held for years the primacy in Bank Locks against the most famous foreign or domestic products. It was invented by Dr. Andrews of Perth Amboy, N. J., of the firm of Day & Newell, New York, by whom it was manufactured about 1841. It was taken to England by A. C. Hobbs, the manufacturer's agent, who was also a recog-



Fig. 5.—Seventh Floor, Central Room, Between Elevators.

nized Lock expert, and shown in the Great Exhibition held in the Crystal Palace, London, 1851, where it attained great prominence and was known as the Hobbs Lock. Mr. Hobbs' success in picking the best English Locks and the inability of the English Locksmiths to pick this Lock led to what in Lock lore became known as the Great Controversy, and which extended over a period of years in which many pick-lock contests were formally arranged, with committees of well-known English Lock experts as arbitrators, the reports of the proceedings as they occurred being given prominence in the great dailies, such as the *London Times*, &c. Mr. Hobbs at times had as many as eight or nine of his regular stock Locks of commerce (i. e., not special test Locks) under test at a time, which his English competitors were unable to pick.

In 1856, however, Linus Yale, Jr., the founder of the Yale & Towne Mfg. Company, gave the Lock its *coup de grace*, and "played hob" with the reputation it had gained, by successfully picking it. The workmanship of the Lock in its minutest details is a masterpiece of skill for Lock work of that period.

An inherent weakness in any Key Lock developed with the progress made in high explosives, such as liquid nitroglycerine, &c., which could be poured into even cracks and crevices and, properly muffled, exploded so as to destroy the Lock without attracting much notice. This led to the invention of the Time Lock for safes, bank and safe deposit vaults and other depositories of valuables, a half dozen examples of which were exhibited in con-

junction with this Lock by Yale & Towne recently before it was presented to the Hardware Club. In the group were fine triple and quadruple movement Time Locks and other examples of Burglar Proof Combination Locks, Automatic Operating Devices, &c., made by the same company.

### MOORE & HANDLEY HARDWARE COMPANY.

**M**OORE & HANDLEY HARDWARE COMPANY, Birmingham, Ala., have commenced work on their new establishment, which will consist of two buildings, one located on Twentieth street and Avenue A, 82½ feet front by 150 feet along Avenue A, five stories high, and the other on the corner of Avenue A and Twenty-first street, 175 feet front by 182½ feet deep, three stories high, located on the tracks of the Southern Railway and S. A. L., giving room for unloading five cars at a time. The two buildings will furnish a floor space of 157,687 square feet. The buildings will be of slow burning or mill construction and equipped with electrical elevators and cranes for handling heavy goods with the greatest facility. The main offices will be located on the ground floor in the building fronting on Twentieth street, the main thoroughfare through the city, and near the Union passenger station. The company will build a modern up to date building, suited to their growing business, and contemplate using every convenience suggested by their experience and observation. When completed they expect to have one of the best arranged Hardware houses in the South.

### PACIFIC COAST NEWS.

SAN FRANCISCO, April 20, 1903.

**T**HE outlook for trade continues to be of the very best description. Orders for almost every description of Hardware and iron and steel tax the capacity of the leading houses to fill. The outlook for Agricultural Machinery of every description suitable to the coming season could hardly be better. As it is, a great breadth of land has been sowed to wheat and barley, and as the season could not have been more suitable to the labors of the agriculturist the crop reports predict the largest wheat and barley crops that we have had for a long series of years. All the farmers have money, and long standing mortgages are being paid off every day. The present fall ought to be the most prosperous that our California farmers ever had, as profits will be larger than for many a long day, the concluding portion of last year and the early part of the present alone excepted. What is said of cereals will also apply to fruit, and, in fact, to almost every industry in the land, and the building boom, both in city and country, continues unabated. There will be sold during 1903 25 to 30 per cent. more building Hardware than during 1902, and that was a big advance on its predecessor. Every other department promises an increase, too. The new mills and the improvements in the old ones in the redwood and sugar and white pine sections of the State will call for an expenditure of \$600,000 to \$700,000, and taking in the coast the amount will exceed \$1,000,000, of which the greatest part will be for Machinery, Saws, Shingle Machines, &c. And here I may say that there will be several new shingle mills in Humboldt and Mendocino counties during the year. Each one will require from two to five Shingle Machines. The oil fields will require their quota of Machinery, Casing, &c. Then quite a number of short railroads are planned in different parts of the State, and including the Southern Pacific and Santa Fé extensions into Mendocino and Humboldt counties the total will easily reach 500 miles, all of which will call for Steel Rails, Engines, &c.

One of the most important changes in San Francisco commercial circles for a long time has been the retirement of Chas. E. Miller from the presidency of the Pacific Hardware & Steel Company. When the writer first knew Mr. Miller he clerked for a California street Hardware firm. That was away back in the seventies. Mr. Miller was then quite a young man. Subsequently he was in the employ of Dunham, Carrigan & Co., now the Dun-

ham, Carrigan & Hayden Company. Among his fellow clerks were A. L. Scott, Jno. A. Scott and A. W. Milligan. With Jos. Sloss, son of the late Louis Sloss, one of our leading capitalists and then president of the Alaska Commercial Company, they formed the firm of Miller, Sloss & Scott. They succeeded to the business of Huntington, Hopkins Company, and that of the Hawley Bros. Hardware Company, and afterward amalgamating with the firm of Geo. W. Gibbs & Co. formed the present corporation. Mr. Miller has retired to take a well earned rest after, to my personal knowledge, being in harness for over 30 years. His successor in the presidency of the company, A. L. Scott, is an up to date business man, and is well calculated to direct the destinies of the company at this most important stage in their career. He is a bustling, wide awake Hardwareman, always up to the eyes in business, but always ready to pay attention to the business of the most unimportant caller. There have been quite a number of changes in the Hardware and iron business of San Francisco during the past dozen years or so, and the foundation of the great future business houses of this description is being slowly but surely laid.

J. O. L.

### TRADE ITEMS.

THE Heavy Hardware merchants of Chicago have recently received a communication from the Heavy Iron and Hardware Men's Union agitating a new scale of wages. The employees desire to establish a system by which \$12 per week will be paid to porters during the first year of their service and \$13.50 per week after the first year, until the employee is engaged in the county and city order shipping department, when the wages will be increased to \$15 per week. It is further decreed that members of the union shall not be discriminated against because of old age. The union, which was organized last October, is said to have a membership of 600. Thus far no action has been taken in the matter by the employers.

THE AMERICAN FILE COMPANY, Boston, Mass., were incorporated under the laws of the State of Maine on March 1, to engage in the business of sharpening Files under a patented process owned by the company. The equipment of their factory, which is located on Wormwood street, South Boston, will shortly be increased by the addition of 40 new machines, now building. The company claim their process to be very effective, and already have a large number of prominent firms on their books. The authorized capital of the company is \$300,000. The Boston office is at 45 Milk street.

THE KEYSTONE COMPANY, Sterling, Ill., will open a branch house in the Rumely Building at Kansas City, Mo., which will be under the management of E. W. Geiger and L. C. Patterson.

THE directors of the Western Retail Implement and Vehicle Dealers' Association met in regular session at Kansas City, April 15 and 16. Those present were Ed. Heeney, president; N. D. Robnett, vice-president; T. G. Wiles, H. E. Noble, I. N. Mains, C. G. Cochran, F. Coladay, H. J. Hodge and F. K. Allen, chairman Harvester Committee. The report of the secretary was presented, announcement made by the president of the standing committees for the coming year, and other matters of business taken up, especially the adjustment of complaints. It was decided to hold the next convention at Kansas City, January 19, 20 and 21, 1904.

ANDREW L. BOYD announces his withdrawal from the firm of Alder & Boyd, 37 Warren street, New York, who for the past five years have been manufacturers' agents in New York for export trade, at the expiration of the copartnership agreement, April 30, 1903. Mr. Boyd will establish himself at 56 Reade street, and continue to do a similar business for manufacturers as direct representative in New York and metropolitan territory for both export and domestic trade in such goods as Hardware, Tools, Power Transmission, Supplies, &c. Mr. Boyd was for ten years with Fuller Bros., and for five years with the Whitman & Barnes Mfg. Company, before forming the partnership of Alder & Boyd.



### KELLY'S DIRECTORIES.

**K**ELLY'S DIRECTORIES, LIMITED, London, England, represented in the United States by Kelly & Co., 417 and 418 Temple Court, New York, have just issued the seventeenth revised edition of "Kelly's Directory of the Merchants, Manufacturers, Shippers and Buyers of the World." It includes all countries, even Iceland and Greenland, and is thoroughly indexed, both geographically and as to trades. It contains a concise statistical account of each country, its ports and principal towns, with a short topographical account and the population of each, together with classified lists of consuls, bankers, importers, exporters, merchants, commission merchants, brokers and shipping agents and buyers of imported goods, or manufacturers of goods exported. There is also a section containing all the various customs tariffs. In importing countries, like South America, South Africa, Australasia, West Indies and Central America, the names of shopkeepers likely to purchase foreign made goods are given. This directory is issued annually, the information being compiled by a regular corps of travelers. The company publish over 250 distinct directories, covering all official directories of England, both trade, county and town and the official post office directories of Australia, New Zealand and Tasmania. Their "General Directory of South Africa" is also just out, being the first book issued since the Boer war, the last one having been published in 1896. It embraces the whole of South Africa, including Cape Colony, Natal, Orange River Colony, Transvaal, Rhodesia, Basutoland, Bechuanaland, Mashonaland, Portuguese East Africa and other sections. Another important directory is the "Post Office London Directory," which is sectioned off with alphabetical lists, court or elite lists and business lists, giving every town in England, population, railroads, hotels and distances from London banking sections, banks of the world having British correspondents, &c.

### SIDNEY SHEPARD & CO.

**S**IDNEY SHEPARD & CO., Buffalo, N. Y., proprietors of the Buffalo Stamping Works, have just issued Catalogue No. 67, containing 552 pages, bound in cloth. Some idea of the extensive assortment of goods the company manufacture and deal in is afforded by a recapitulation of the 18 sections into which the catalogue is divided. Section 1 illustrates and describes notable Kitchen Specialties, including patented Buffalo and Perfection Goods; No. 2, Deep Stamped Ware; No. 3, Shallow Stamped Ware; No. 4, Tinsmiths' Trimmings; No. 5, Pieced Tinware; No. 6, Ideal Anti-Rusting Tinware; No. 7, Japanned Ware; No. 8, Black and Galvanized Sheet Steel Ware; No. 9, Coal Vases; No. 10, Copper Ware; No. 11, Milk Cans, Pails and Trimmings; No. 12, Oil Tanks; No. 13, Ice Cream Freezers; No. 14, Enameled Ware; No. 15, Tin Plates, Black and Galvanized Sheets and Metals; No. 16, Tinsmiths' Supplies and Miscellaneous House Furnishing Goods; No. 17, Tinsmiths' Tools and Machines; No. 18, Spice Cans and Caddies, Tin Cans, Tin Boxes, &c. Besides the works at Buffalo, the company have branch houses in New York, Chicago, St. Louis, Kansas City, Denver, Seattle and San Francisco.

### TEXAS HARDWARE JOBBERS' ASSOCIATION.

**T**HE annual meeting of the Texas Hardware Jobbers' Association was held in Dallas on the 15th and 16th inst. The following officers were elected for the ensuing year: J. C. Bering, president; J. B. Burnside, first vice-president; Mr. Taylor, second vice-president; R. F. Bell, secretary-treasurer. The meeting was a very interesting one, and considerable work of importance was mapped out to be taken up during the year.

A. C. Cole & Sons, Maxwell, Iowa, have disposed of the Hardware part of their business to Sid. R. Clift, but will continue in the Farm Implement business as heretofore. Mr. Clift was formerly sales manager of the David Bradley Mfg. Company, Bradley, Ill.

### AMONG THE HARDWARE TRADE.

The Western Hardware Company, Leadville, Col., have been incorporated with a capital stock of \$15,000. The company are wholesale and retail dealers in Shelf and Heavy Hardware, Stoves, Tinware, &c.

E. E. Donaldson, dealer in general Hardware, Wellston, Ohio, has disposed of his business to J. C. Clutts and Melvin Tilley.

The J. H. Wiese Company have purchased the Hardware and Agricultural Implement business formerly conducted by W. H. Kuehl, in Eldridge, Iowa.

J. E. Duggan of Ivesdale, Ill., has sold his stock of Hardware, Stoves, Furnaces, Wind Mills, Paints, Oils, &c., to S. A. Schultz of Gridley, who will continue the business at the old stand.

Wylie Reaney has purchased the Hardware store of Snodgrass & Gromo, at Claysville, Pa. By previous agreement he becomes the partner of N. B. Brockman, proprietor of the Claysville Hardware Company. It is the intention of the new firm to consolidate the new stores under the style of Claysville Hardware Company. The salesroom will be the one now occupied by Mr. Brockman. The premises formerly occupied by Snodgrass & Gromo will be utilized for the storing of goods. The company's line includes Shelf and Heavy Hardware, Stoves and Tinware, Agricultural Implements, Paints, Oils, &c.

Pearce & Fetzner have recently embarked in the retail business in Salem, S. D., handling Heavy and Shelf Hardware, Stoves, Tinware, Paints, Oils, &c.

Sutherland & Anderson are successors to Sutherland & Godden in the Hardware and Farm Implement business in Waverly, Lancaster County, Neb. They have remodeled and enlarged the old building, and the establishment is now 40 feet front by 50 feet in depth. They have also added a line of furniture to their former stock.

William Ireland has purchased the business of Ritz & Co., Drakeville, Iowa, and will continue the retail business in Shelf Hardware, Stoves, Tinware, Agricultural Implements, Sporting Goods, Buggies, Wagons, Lumber, Builders' Material, Tile, Brick, &c.

Gilbert & Sturtz, Arkansas City, Kan., have incorporated their business under the style of Gilbert-Sturtz Hardware Company. The officers and directors of the new company are S. J. Gilbert, president; Frank Welier, vice-president; Chas. Sturtz, secretary and treasurer; W. L. Sturtz and L. A. Sturtz. The company's business is both wholesale and retail, and covers Hardware (Shelf and Heavy), Farming Implements, Stoves and Tinware, Paints, Oils, Sporting Goods, &c.

Muckenthaler Hardware Company have bought the Hardware stock formerly carried by the Paxico Lumber Company, Paxico, Kan., who will hereafter confine themselves to the sale of lumber and coal.

Lee & English, who have been in the Hardware business in Baraboo, Wis., for a number of years, have taken in another partner and incorporated under the laws of Wisconsin, the style being Lee-English Hardware Company, and the capital \$20,000. The new member is August Ockershauser, who has been employed in the store for the past three years. The officers of the company are: C. H. Lee, president; T. W. English, treasurer; August Ockershauser, secretary.

The B. F. Luke Company have been incorporated at Salt Lake City, Utah, with a capital stock of \$25,000, for the purpose of doing a general Implement business. The officers of the company are P. W. Madsen, president; B. F. Luke, vice-president and manager; E. W. Madsen, secretary and treasurer.

Shannon & Cannon, Toronto, Kan., have disposed of their business in Hardware and Agricultural Implements to Sample & Thompson, who continue at the old stand.

Breckenridge-Bradshaw Company, Crawfordsville, Ind., have been incorporated with a capital stock of \$10,000. They are successors to Gould, Oliver & Martin. The new concern have overhauled the old stand with a view to making it more convenient and attractive. They report a good business, with excellent prospects for the future.

Dorsey & Seyb is the style of a new firm at Kahoka, Mo., who are handling Shelf and Heavy Hardware, Stoves and Tinware, Agricultural Implements, &c.

The Kerr Hardware Company have succeeded the Capitol Hardware Company in Boise City, Idaho. They occupy a new building which has been stocked with new goods.

Perkins Hardware Company, Waukesha, Wis., have purchased the stock of the Watson Hardware Company, Mr. Watson having retired. The two stocks will be combined at the Perkins establishment. A complete repair department will also be conducted in which all kinds of galvanized iron, copper and tin work will be done.

After having been in the business for 39 years J. S. Bradley has disposed of his stock and store in New Berlin, N. Y., to Harry M. Sackett, who will continue at the old stand.

The Boyd-Tolson Hardware Company, Fayette, Mo., have been succeeded by the Tolson Hardware & Implement Company.

Baker & McCabe, Packwood, Iowa, have disposed of their business to the Packwood Hardware Company.

K. Crist has retired from the Hardware business in Lawrenceburg, Ind.

Charles E. Barnard has disposed of his interest in the Hardware firm of Barnard & Starr, Jackson, Mich., and the style is now Starr Hardware Company.

The Higgins-Wasgatt Hardware Company, Albert Lea, Minn., have been succeeded by the M. J. Higgins Hardware Company, who will continue the retail business in Shelf and Heavy Hardware, Stoves, Tinware, Agricultural Implements, Sporting Goods, &c.

Fanning & Muffin have disposed of their Hardware, Stove and Agricultural Implement business at Davenport, N. Y., to L. D. Ware.

Chas. A. Coffin has sold his Hardware business in Allen, Neb., to Saberson Bros. & Co., who have removed the stock thus purchased to a new location near their lumber yard.

J. P. Johnson & Son have purchased the Hardware, Stove, Sporting Goods and Furniture business of T. J. Steen in St. Paul, Neb.

A charter will be asked May 12 for the Swank Hardware Company, Johnstown, Pa. The incorporators are George Swank, Charles R. Glock and Morrell Swank. The firm have an established business in Johnstown, being among the oldest business houses there, and will be incorporated in order to admit several old employees.

The Sedgwick Hardware Company, Caledonia, N. Y., are successors to the Hardware business of J. M. Matteson & Co. and the plumbing, heating and pump business of A. P. Sedgwick. The company have been incorporated with a capital stock of \$10,000 and the following officers: A. P. Sedgwick, president; Robert J. Fraser, vice-president; C. S. Torney, secretary and treasurer.

Itta Bena Hardware Company, Itta Bena, Miss., re-

cently incorporated with a capital stock of \$20,000, have just completed a new building in which they will conduct the wholesale and retail business in Shelf and Heavy Hardware, Stoves, Tinware, Farming Implements, Sporting Goods, &c. S. M. Kimbrough, formerly secretary-treasurer of the Cotton Oil Company, is the general manager.

## MISCELLANEOUS NOTES.

### Thor Bicycle Motor.

The Aurora Automatic Machinery Company, Aurora, Ill., whose sole selling agents are Brandenburg Bros. & Alliger, 103 Reade street, New York, are manufacturing the Thor gasoline motor for bicycles. The cylinder is a special casting lapped carefully inside. The outer flanges are machine turned to give uniform thickness in the metal walls, which keeps the cylinder from losing shape when hot, and the entire cylinder is nickel plated. The tread is extremely narrow and long bearings are provided, the bicycle complete with motor, 5-inch tread and regular wheel base weighing but 98 pounds. With road gear this motor is said by the manufacturers to take any grade up to 20 per cent. without pedaling and a speed of 40 miles an hour can be readily made. With racing gear, it is said, any stock machine of this make will cover a mile in 1 minute and 18 seconds. The carburettor is a special feature, insuring a uniform mixture under varying conditions with throttle open or shut. Ten bicycle manufacturers are building complete machines using the Thor motor.

### Gas and Electric Portables and Lamps.

Plume & Atwood Mfg. Company, 29 Murray street, New York, have recently put on the market a fine new line of gas and electric portables in nearly 100 different patterns, styles and finishes. Among the latter are old brass and black, Pompeian bronze, Tiffany copper and oxidized silver, Japanese Bronze, old brass and verde, Cyrano and old brass, dead black and red, old Gold, &c. They also have ready for the trade a new line of kerosene oil lamps, both center draft and duplex burners, which can be furnished in all of the above finishes except the Tiffany copper. Both portables and lamps are in beautiful new designs, the latter being in table and stand lamps, and some of the Colonial column order.

### The Susquehanna Bomb.

The bomb which is shown full size in the accompanying cut is designed to fire .22 caliber blank cartridges. The openings are so arranged as to enable the operator to



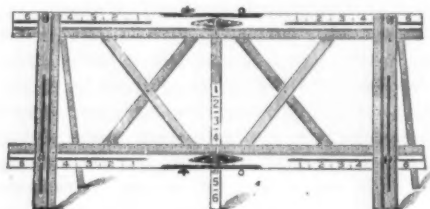
The Susquehanna Bomb.

readily remove the cartridge after it has been exploded. The bombs are made with the handle socket in two sizes, to take sticks either 7-16 or 1/2 inch in diameter. Both sizes take the .22 caliber cartridges. The bombs are offered by the Susquehanna Castings Company, Wrightsville, Pa.



### The Wagner Self Squaring Curtain Stretcher.

The accompanying cut represents a self squaring curtain stretcher offered by the Wagner Curtain Stretcher Company, Greensburg, Pa. The stretcher is made from selected basswood, the pins are amply heavy and of triple plated brass, and the bolts are of best quality rolled steel. The stretcher is referred to as being self squaring, self supporting, self bracing, rigid and immovable. It is explained that there is no bolt or any preliminary work to bring it into readiness for use, that where it stops it stays and that sagging is impossible. It can be adjusted to any size from a handkerchief to a curtain 6 feet in width and 13 feet in length. When



*The Wagner Self Squaring Curtain Stretcher.*

the curtains are stretched on it, it can be folded to half its size and carried anywhere without injury to the curtains. When not in use the stretcher can be folded, occupying a space  $6\frac{1}{2}$  feet long and 6 inches wide. Particular attention is called to the fact that the end pieces move back and forth on the front of the frame, while the x or self squaring pieces work on the back, thus preventing all interference, as each works independently of the other. It is pointed out that the center brace is ruled to correspond with the end pieces, and is fastened at top and bottom, making it impossible for either frame or curtain to sag in the center. This piece also acts as a center foot.

### Rotameter.

Henry Kahn & Co., 189 Broadway, New York, have put on the market an instrument for the use of machinists and others called the Rotameter, as here illustrated. This device is made in two sizes, nickel plated, with 1-inch and  $1\frac{1}{2}$ -inch dials, the illustration being a *fac-simile* reproduction of the 1-inch size. The Rotameter is designed for measuring surfaces by merely running the projecting wheel any distance up to 25 feet, the large hand traversing the outer dial reading to 12 inches, graduated by  $\frac{1}{8}$  inch, the inner dial registering feet



*Rotameter.*

as recorded by the short hand. It is recommended by the manufacturers as especially valuable as a surface speed indicator in machine lathe work in connection with steel castings and forgings, &c., to ascertain the proper speed at which to run the lathe in various kinds of work. A demand for such a tool has been created by the new high speed steels that are now being placed on the market in order to ascertain the number of feet per minute the lathe spindle travels. The Rotameters are made to

record inches and feet, as shown, or metric measure, in both sizes.

### The Gem Flour Sifter.

The J. L. Clark Hardware Company, Rockford, Ill., are placing on the market the flour sifter shown herewith. A feature of the device is the removable agitator,

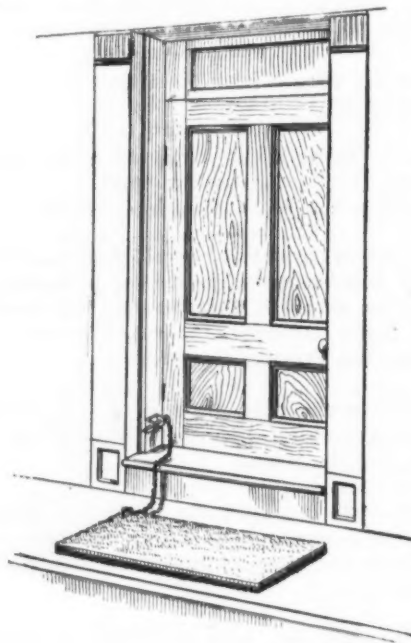


*The Gem Flour Sifter.*

which permits the goods being closely nested for shipment. Each dozen sifters is packed in a heavy pasteboard carton.

### Oliver's Safety Door Mat Lock.

S. F. Oliver, 1092 Lafayette avenue, Brooklyn, N. Y., has just patented and put on the market the Oliver safety door mat lock, here shown, for securing door mats against petty thieving. At one end of a 3-foot length of Triumph wire link chain is a pointed wrought



*Oliver's Safety Door Mat Lock.*

iron pin,  $\frac{1}{4}$  x 3 inches, with a  $\frac{3}{4}$ -inch ring at the other end. In use the sharpened pin is forced through one corner of the mat and then through the ring on the opposite end, drawing the chain through the ring, the locking being accomplished by means of a metal U-shaped bracket screwed to the door casing with the back end slightly raised and near the door so that by slipping the pin in at the back and closing the door, it is impossible to withdraw the pin until the door is opened. If less chain is required the pin will pass through any of the links placed between the two holes of the bracket without permanently shortening the chain. It will be seen this form of fastening, while locking the mat, gives the owner instant control of it for cleansing and makes unnecessary the use of padlock and key. The fastening is tinned to prevent rust.

### Stevens Sliding Breech Block Action.

In Fig. 1 is shown a new drop forged sliding breech block action which the J. Stevens Arms & Tool Company, Chicopee Falls, Mass., have perfected, and which will supplant the old style action which they have been using

made to order screens. The screen is made from hard wood and finished in oil. Both sides are finished alike, and it has an adjustment of  $7\frac{1}{2}$  inches. The screen can be attached to the window stops by means of sliding strips, and can be raised or lowered from the inside without removing it from the window. The sliding strips are



Fig. 1.—Stevens Sliding Breech Block Action.

on their Ideal rifles for many years. The new style frame, catalogued No. 44½, is illustrated in Fig. 2. The strength of the action is described as permitting the use of modern heavy charges, and its ease of manipulation is

twice the height of the screen, which permits the screen to be used on either the upper or lower half of the window. The screen can be raised to any desired point, and the brass guides will hold it in position. To remove the

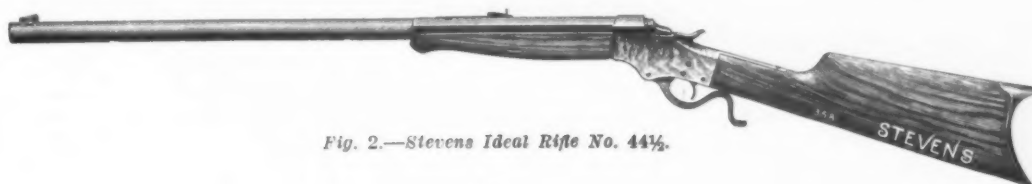
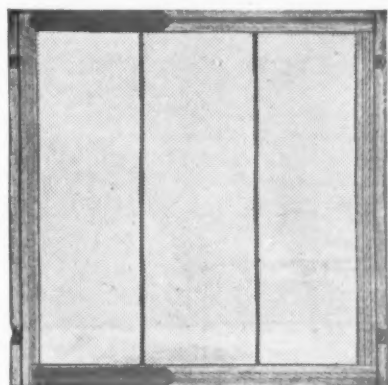


Fig. 2.—Stevens Ideal Rifle No. 44½.

emphasized as a conspicuous feature. It is remarked that the popular lever action is retained, but greatly improved with sliding breech block. The dropping of the lever leaves a free inspection of the barrel from the breech, permitting quick loading. Bringing back the lever raises and carries forward the strong breech block with a rocking motion, which is alluded to as preventing any possibility of buckling the shell, thus properly seating the cartridge in the chamber and finally securely locking the action ready to be discharged. The standard length of barrel for rim fire cartridges is 24 inches, weight 7 pounds, and for center fire cartridges 26 inches, weight  $7\frac{1}{2}$  pounds, and made in all standard calibers. All of the company's Ideal rifles, Nos. 44½ to 54, will be fitted with the new style frame and action. The manufacture of the No. 44 will be continued with the old style action, but in the .22-25 and .32 rim fire and .25-20 and .32-20 center fire calibers only.

### The Porter Adjustable Sliding Screen.

The accompanying illustration represents an adjustable sliding window screen, offered by the Porter Screen



The Porter Adjustable Sliding Screen.

Mfg. Company, Burlington, Vt. The screen is referred to as combining the good points of both the adjustable and

screen from the window the sides of the frame are pressed toward the center.

### The Warren New Cabinet.

The J. D. Warren Mfg. Company, Chicago, Ill., have added to their line of hardware store fixtures the cabinet shown herewith. Its important feature is an ingenious device by which all drawers resting on a shelf can be drawn out simultaneously, enabling the different styles

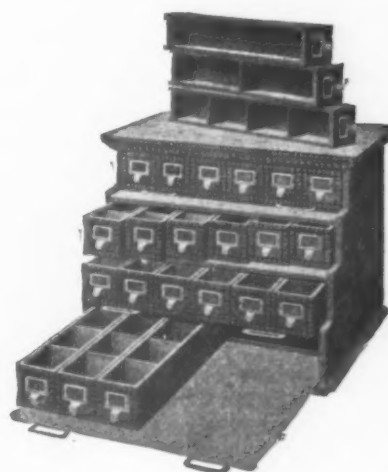


Fig. 1.—The Warren New Cabinet.

or patterns in the compartments of that space to be seen at once. When a definite article is desired and its location known only the drawer containing it need be drawn out. The drawers vary in length, Fig. 2, and are arranged in steps adapted to classes of goods that increase in size as the number advances; for instance, in screws, 96 spaces are provided for that number of full packages of standard assorted sizes. For bright wire goods, stove bolts and rivets the same arrangement is practical. By removing part or all of the partitions in a drawer, as shown at the top of Fig. 1, the cabinet is equally prac-



tical for files, chisels, augers and goods of a similar nature. The drawers so arranged are also suitable for many articles of builders' hardware, especially various classes of brass, steel and bronze butts. The cabinet is

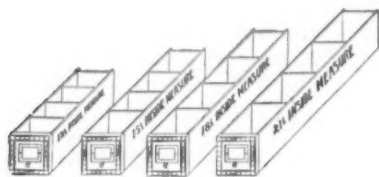


Fig. 2.—Drawers of the Warren Cabinet.

26 inches long, 21 inches high, 18 inches deep at top, 26 inches deep at bottom, made in light antique oak. The drawers are 4 inches high by 4 inches wide, varying in length from 14 to 23 inches, divided into four spaces with partitions which are removable.

### The Marlin Grade B Repeating Shotgun.

The Marlin Firearms Company, New Haven, Conn., are introducing their grade B repeating shotgun shown



The Marlin Grade B Repeating Shotgun.

in the accompanying cut. It is not as elaborate in style as the grades C and D, but very much nicer in finish than the grade A. Like grade A, it is explained, grade B is reliable, quick of action, simple and easy to operate, having comparatively few parts. It has a solid top and side ejector and throws the shells away from the shooter's face. The grip of the stock and the forearm are both checked by hand, which is referred to as not only aiding the shooter in holding and sighting, but assisting in the rapid manipulation of the repeater. For the stocks in grade B, although plain wood is used, the wood is selected with special care. The barrels are made of the highest grade of special smokeless barrel steel. Each gun is subjected, it is pointed out, to rigid inspection and exhaustive tests. The gun is made with barrels 26, 28 and 30 inches long, all six shot, furnished with cylinder, modified or full choke boring.

### Automatic Closing Hinged Fire Doors.

The device for automatically closing hinged fire doors herewith illustrated has recently been put on the market



Automatic Closing Hinged Fire Doors.

by Jas. Peters & Son, Philadelphia, Pa. The device is described as being so constructed as to secure double secu-

urity, there being two fusible links, one on each side of the opening and in no way connected with the door. The door is thus free on its hinges, and can be opened and shut at will, while the action obtained by the release of the fusible links will, it is explained, positively close the door, no matter in what position it may be. The device consists of a heavy cast iron wheel, with a wrought iron arm attached to it, supported in an iron frame which is bolted to the wall. A chain with a weight attached is wound around the wheel, while a cord with fusible link is wound about the wheel in the opposite direction, thus opposing the tendency of the weight to swing the arm and act on the door. The melting of either of the two fusible links will release the weight, which in turn causes the wheel to revolve and the arm to strike the door, automatically closing it.

### The Walton Self Locking Block.

The Walton Self Locking Block Company, Boston, Mass., are offering the self locking block herewith shown. The sheave of the pulley has on one side of its rim a true screw, and on the other side a cam screw. When the rope is guided to the right it is choked by the cam screw against a pin in the block.

When the rope is pulled to the left it is released and runs easily on the sheave. It is claimed that there is



The Walton Self Locking Block.

no friction to wear the rope. The device, it is remarked, is applied not only to pulley blocks, but to raising and lowering electric lights, curtains, awnings, &c.

# Current Hardware Prices.

REVISED APRIL 28, 1903.

**General Goods.**—In the following quotations General Goods—that is, those which are made by more than one manufacturer, are printed in *Italics*, and the prices named, unless otherwise stated, represent those current in the market as obtainable by the fair retail hardware trade, whether from manufacturers or jobbers. Very small orders and broken packages often command higher prices, while lower prices are frequently given to larger buyers.

**Special Goods.**—Quotations printed in the ordinary type (Roman) relate to goods of particular manufacturers, who are responsible for their correctness. They usually represent the prices to the small trade, lower prices being obtainable by the fair retail trade, from manufacturers or jobbers.

**Range of Prices.**—A range of prices is indicated by means of the symbol @. Thus 33 1/2 @ 33 1/3 & 10% signifies that the

price of the goods in question ranges from 33 1/2 per cent. discount to 33 1/3 and 10 per cent. discount.

**Names of Manufacturers.**—For the names and addresses of manufacturers see the advertising columns and also The IRON AGE DIRECTORY, issued April, 1902, which gives a classified list of the products of our advertisers and thus serves as a DIRECTORY of the Iron, Hardware and Machinery trades.

**Standard Lists.**—A new edition of "Standard Hardware Lists" has been issued and contains the list prices of many leading goods.

**Additions and Corrections.**—The trade are requested to suggest any improvements with a view to rendering these quotations as correct and as useful as possible to Retail Hardware Merchants.

## Abrasives—

Adamant in Carloads: ... 1 ton \$90@100  
Crystal..... 1/2 ton \$120@140  
Grain..... 1/2 ton \$120@140  
See also Emery.

## Adjusters, Blind—

Don.estic, 1/2 doz. \$3.00..... 33 1/2  
North's..... 1/2 doz. \$3.00..... 10%  
Zimmerman's—See Fasteners, Blind.

## Window Stop—

Ives' Patent..... 25&55  
Taplin's Perfection..... 25&55

## Ammunition—See Caps, Cartridges, Shells, &c.

## Anvils—American—

Armand Hammer, Wrought..... 83 1/2  
Muel's Patent Trenton..... 83 1/2  
Eagle Anvils..... 7 1/4 @ 7 1/2  
Hay-Budden, Wrought..... 9 @ 9 1/2  
Horseshoe brand, Wrought..... 9 @ 9 1/2

## Imported—

Peter Wright & Sons..... 7 1/2 @ 10 1/2

## Anvil, Vise and Drill—

Millers Falls Co., \$18.00..... 50&10%

## Apple Parers—See Parers, Apple, &c.

## Aprons, Blacksmiths—

Hull Bros. Co.,  
Lots of 1 doz..... 25%  
Smaller Lots..... 26%  
Lots of 3 doz..... 30%

## Augers and Bits—

Com. Double spur..... 70 @ 10 1/2  
Norway Machine Augers..... 66 @ 70  
Car Bits, 12-in. twist..... 60 @ 60 1/2  
Jennings' Pattern

Auger Bits..... 50 @ 10 1/2 @ 10 1/2

Ford's Auger and Car Bits..... 40%

Forstner Pat. Auger Bits..... 25%

C. E. Jennings & Co.

No. 10 ext. lip, R. Jennings' list 25 & 10%

No. 30, R. Jennings' list 10 1/2 @ 10 1/2

Russell Jennings..... 25 & 10 1/2 @ 10 1/2

L'Hommiedieu Car Bits..... 15 & 10 1/2

Mayhew's Countersink Bits..... 45%

Millers' Falls..... 50 & 10 1/2 @ 10 1/2

Pugh's Black..... 20%

Pugh's Jennings' Pattern..... 35%

Snell's Auger Bits..... 50%

Snell's Bell Hangers' Bits..... 50 & 10 1/2

Snell's Car Bits, 12-in. twist..... 60%

Wright's Jennings Bits (R. Jennings' list)..... 50%

## Bit Stock Drills—

Standard list..... 65 @ 5 @ 70%

## Expansive Bits—

Clark's small, 1/16 in. large, 26..... 50 & 10%

Lavigne's Bits' Pattern, No. 1, 1/2 doz., 26; No. 2, 1 1/2..... 50 & 10%

C. E. Jennings & Co., Steer's Pat., 25 & 10%

Swan's..... 60%

## Gimlet Bits—

Common Double Cut, gro. \$2.50 @ 3.00

German Pattern..... gro. \$4.00 @ 4.25

## Hollow Augers—

Bonney Pattern, per doz. \$11.00 @ 11.50

Ames..... 25 & 10%

New Patent..... 25 & 10%

Universal..... 25%

Wood's Universal..... 25%

## Ship Augers and Bits—

S.ell's..... 40%

C. E. Jennings & Co.

L'Hommiedieu's..... 15 & 10%

Watrous..... 33 1/2 @ 10 1/2

## Awl Hafts, See Hafts, Awl.

## Awls—

Brad Arls:

Handled..... gro. \$2.75 @ 3.00

Unhandle, Shouldered, gro. 53 @ 56

Unhandle, Patent..... gro. 56 @ 70

Peg Arls:

Unhandle, Patent..... gro. 51 @ 30

Unhandle, Shouldered, gro. 55 @ 70

Scratch Arls:

Handled, Common, gro. \$3.50 @ 4.00

Handled, Socket, gro. \$11.50 @ 12.00

Hurwood..... 40%

Awl and Tool Sets—See Sets, Awl and Tool.

**Axes—**

First Quality, factory brands..... \$6.00

First Quality, jobbers' brands..... \$5.50

Second Quality..... \$5.00 @ 5.25

**Axle Grease—See Grease, Axle.**

## Axles—

Concord, Loose Collar..... 1 1/2 @ 1 1/2

Concord, Solid Collar..... 1 1/2 @ 1 1/2

No. 1 Common..... 3 1/2 @ 4

No. 1, Com. New Style..... 3 1/2 @ 4

No. 2, Solid Collar..... 1 1/2 @ 1 1/2

Nos. 11 to 15..... 60 @ 10 @ 10 1/2

Nos. 15 to 18..... 70 @ 10 @ 10 1/2

Nos. 19 to 22..... 70 @ 10 @ 10 1/2

Common and Concord, not turned..... 1 1/2 @ 1 1/2

Common and Concord, turned..... 1 1/2 @ 1 1/2

Half Patent..... 1 1/2 @ 1 1/2

Patman's..... 1 1/2 @ 1 1/2

## Balances—Sash—

Caldwell new list..... 50%

Foillman's..... 60%

## Spring—

Spring Balances..... 50 & 10 @ 6 1/2

Chatillon's:

Light Sg. Balances..... 40 & 10%

Straight Balances..... 40%

Circular Balances..... 30%

Large Dial..... 30%

Perouse..... 50%

## Barb Wire—See Wire, Barb.

## Bars—Crow—

Steel Crowbars, 10 to 40 lb., per lb. @ 3 1/2

## Towel—

No. 10 Ideal, Brass Finish..... 1/2 gro. \$8.50

No. 20 Ideal, Brass Finish..... 1/2 gro. \$8.50

## Baskets—

Hoffman's Brick Baskets..... each \$3.25

## Beams, Scale—

Scale Beams, List Jan. 12, '92, 40 @ 10%

Chatillon's No. 1..... 30%

Chatillon's No. 2..... 40%

## Beaters—Egg—

Lightning Chain, 1/2 doz., \$1.15; 1/2 gro..... \$12.00

National Mfg. Co.:

No. 1 Dover, Family size..... \$7.00

No. 2 Dover, Hotel size..... 14.00

Taplin Mfg. Co.:

No. 60 Improved Dover..... \$6.50

No. 75 Improved Dover..... \$7.50

No. 75-2 Imp'd Dover, Tin'd..... \$9.00

No. 100 Improved Dover, Tin'd..... \$9.50

No. 102 Improved Dover, Tin'd..... \$9.50

No. 150 Improved Dover, Hotel, Tin'd..... \$17.00

No. 200 Imp'd Dover Tumbler..... \$9.00

No. 302 Imp'd Dover Tumbler, Tin'd..... \$10.00

No. 300, Imp'd Dover Mammoth..... \$7.00

Wonder (S. S. & Co.)..... 1/2 gro. \$2.00

## Bellows—

Blacksmith, Standard List 70 @ 70 & 10%

## Blacksmiths'—

Inch..... 30 32 34 36 38 40

Each..... \$3.50 3.75 4.25 4.80 5.35 6.15

Extra Length:

Each..... \$4.00 4.55 5.10 5.60 6.40 7.50

## Molders—

Inch..... 9 10 11 12 13

Doz..... \$5.00 9.50 10.90 12.30 14.25

## Hand—

Inch..... 6 7 8 9 10

Doz..... \$4.75 5.70 6.60 7.60 8.50

## Bells—Cow—

Ordinary goods..... 75 @ 5 @ 75 & 10%

High grade..... 70 @ 70 & 10%

Jersey..... 75 @ 10%

Texas Star..... 50%

Abbe's Gong..... 45%

Barton Gong..... 55%

Home, R. & E. Mfg. Co.'s..... 55 & 10%

Lever and Pull, Sargent..... 60 & 10%

Yankee Gong..... 35%

Hand Bells, Polished..... 60 @ 5 @ 60 & 10%

White Metal..... 55 @ 55 & 10%

Nickel Plated..... 50 @ 50 & 10%

Swiss..... 60 @ 60 & 10%

Cone's Globe Hand Bells..... 30 @ 30 & 10%

Silver Chime..... 30 @ 30 & 10%

**Miscellaneous—**

Farm Bells..... 1/2 @ 2 @ 4

Steel Alloy Church and School..... 60%

American Tube & Stamp'g Co. Gong..... 70%

Tripp Gong Bells..... 55 @ 10 @ 60

## Belting—Rubber—

Agricultural (Low Grade)..... 75 @ 10 @ 80%

Common Standard..... 75 @ 75 @ 10%

Standard..... 70 @ 70 @ 10%

Extra..... 60 @ 10 @ 5%

High Grade..... 50 @ 10 @ 50 @ 10 @ 5%

Boston Belting Co.:

Seamless Stretched Imperial..... 45 @ 5%

Roston..... 50 @ 5%

Nagara..... 60 @ 5%

## Leather—

Extra Heavy, Short Lap..... 60 @ 60 @ 5%

Regular Short Lap 60 @ 10 @ 60 @ 10%

Standard..... 70 @ 70 @ 10%

Light Standard..... 70 @ 70 @ 10%

Cut Leather Lacing..... 50 @ 10%

Leather Lacing Sides, per sq. ft. 18

## Bench Stops—See Stops, Bench

## Benders and Upsetters, Tire—

Detroit Perfected Tire Bender..... 40%

Green River Tire Benders and Upsetters..... 20%

Detroit Stoddard's Lightning Tire Upsetters, No. 1, \$3.75; No. 2, \$6.50; No. 3, \$9.50; No. 4, \$14.75; No. 5, \$18.75.

## Bicycle Goods—

John S. Leng's Son's 1902 list:

Chain..... 50%

Spokes..... 50%

Spokes..... 50%

Tub..... 60%

## Bits—

Auger, Gimlet, Bit Stock Drills, &c.—See Augers and Bits.

## Blocks—Tackle—

Common Wooden..... 70 @ 10 @ 75%

Hollow steel blocks, with Ford's Patent Sheaves..... 50 & 10%

Lane's Patent Automatic Lock and Junior..... 30%

Stowell's Novelty, Mal. Iron..... 50 & 10%

See also Machines, Hoisting.

## Boards Stove—

Zinc, Crystal, &c..... 30 @ 10%

## Bolts—

Carriage, Machine &c.—

Common, list Feb. 1, '02..... 60 @ 10 @ 60%

Norway Iron, \$3.00, list Jan. 1, '03..... 80 @ 50 @ 5%

Phila. Eagle, \$3.00 list May 24, '99..... 80 @ 50 @ 5%

Bolt Ends, list Feb. 14, '95..... 65 @ 50 @ 60%

Machine, list Oct. 1, '99..... 65 @ 60%

Machine with C & T. Nuts..... 60 @ 24 @ 60%

NOTE.—Jobbers are in many cases underselling the manufacturers.

## Door and Shutter—

Cast Iron Barrel, Round Brass Knob:

Inch..... 3 4 5 6 8

Per doz..... \$9.25 30 39 47 55

Cast Iron Spring Foot:

Inch..... 6 8 10

Per doz..... \$1.00 1.25 1.75

Cast Iron Chain, Flat, Japanned:

Inch..... 6 8 10

Per doz..... \$0.75 1.05 1.30

Cast Iron Shutter, Brass Knobs:

Inch..... 6 8 10

Per doz..... \$0.57 80 1.00

Wrought Barrel Brass Knob:

Inch..... 3 4 5 6 8

Per doz..... \$0.44 50 61 70 1.28





**Forks**—Aug. 1, 1899, list.

Hay, 3 tine.....	60¢
Hay, 3 tine.....	60¢
Hay, 4 tine.....	60¢
Hay, Header and Baler 3 tine	60¢
Hay, Header and Baler, 4 tine	60¢
Grain or Barley.....	70¢
Manure, 4 tine.....	60¢
Manure, 5 and 6 tine.....	60¢
Spading.....	70¢

**Frames—Saw—**

Red, Polished and Varnished, doz.	\$1.15
White.....doz.	75¢

**Freezers Ice Cream—**

Qts.....	3	4	6	8	10
Best.....	1.65	1.95	2.40	3.00	4.20
Good.....	1.25	1.40	1.70	2.15	2.75
Fair.....	1.00	1.10	1.30	1.75	2.25

**Fruit and Jelly Presses—**  
See Presses, Fruit and Jelly.

**Fry Pans—See Pans, Fry.**

**Fuse—** Per 1000 Feet.

Temp Fuse.....	\$2.60
Cotton Fuse.....	2.30
Single Taped Fuse.....	3.25
Double Taped Fuse.....	4.20
Triple Taped Fuse.....	5.00

**Gates, Molasses and Oil—**

Stebbins' Pattern.....	80¢
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**Gauges—**

Marking, Mortise, etc.....	60¢
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**Chapin-Stephens Co.**

Marking, Mortise, etc.....	50¢
Scholl's Patent.....	50¢
Door Hangers.....	30¢
Fulton's Butt Gauge.....	30¢
Stanley B. & L. Co.'s Butt & Babbet Gauge.....	30¢
Wire, Brown & Sharpe's.....	25¢
Wire, Morse's.....	25¢
Wire P. S. & W. Co.....	30¢

**Chimneys—Single Cut—**

Nail, Metal, Assorted, gro.....	\$1.50
Spike, Metal, Assorted, gro.....	\$3.80
Nail, Wood Handled, Assorted, gro.....	\$1.75
Spike, Wood Handled, Assorted, gro.....	\$3.25

**Glass, American Window**

**Jobs' List, Dec. 16, 1902.**

From store, Single and Double 90¢ & 10¢  
F. O. B. factory, carload lots:  
Single and Double.....30¢  
2000 box lots.....90¢

**Glue—Liquid, Fish—**

List B. Cans (1/2 pts. pts., qts).....	35¢
List C. Cans (1/2 gal., gal.).....	35¢
International Glue Co. (Martin's).....	40¢

**Grease, Axle—**

Common Grade.....	gro. \$5.00
Dixon's Everlasting.....	10-m pails, ea. 85¢
Dixon's Everlasting, in bxs.....	per doz. 1 m \$1.20; 2 m \$2.00

**Griddles, Soapstone—**

Pike Mfg. Co.....	33¢
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**Grindstones—**

Bicycle Emery Grinder.....	60.50
Bicycle Grindstones, each.....	\$2.50

**Pike Mfg. Co.**

Improved Family Grindstones.....	per inch, per doz. \$2.00
Pike Mower Knife and Tool.....	33¢
Grinder, each.....	\$0.60
Velox Ball Bearing, mounted, Angle Iron Frames.....	each, \$3.25

**Guards, Snow—**

Cleveland Wire Spring Co.....	Galv. Steel #1000.....\$9.00
Copper #1000.....	\$18.00

**Halters and Ties—**

Web.....	45¢
Jute Rope.....	40¢
Sisal Rope.....	20¢
Web and Leather Halters.....	70¢
Jute and Manila Rope Halters.....	70¢
Sisal Rope Halters.....	60¢
Jute, Manila and Cotton Rope Ties.....	70¢
Sisal Rope Ties.....	60¢

**Hammers—**

Handled Hammers—	
Helmer's Machinists.....	40¢
Helmer's Farriers.....	40¢
Magnetic Tacks, Nos. 1, 2, 3.....	\$1.35
Peck, Stow & Wilcox.....	40¢
Fayette R. Plumb.....	40¢
Plumb, A. E. Nall.....	35¢
Engineers' and B. S. Hand.....	50¢
Machinists' Hammers.....	50¢
Riveting and Tinniers.....	40¢
Sargent's C. S. New List.....	40¢

**Heavy Hammers and Sledges—**

1 lb. and under.....	1b. 45¢
3 to 5 lb.....	1b. 30¢
Over 5 lb.....	1b. 30¢

Wilkinson's Smiths'.....9¢

**Handles—**

Axe, Pick, &c.....	45¢
Hoe, Rake, &c.....	60¢
Fork, Shovel, Spade, &c.....	60¢
Long Handles.....	60¢
D Handles.....	60¢

**Cross-Cut Saw Handles—**

Atkins.....	40¢
Champion.....	45¢
Diston's.....	50¢

**Mechanics' Tool Handles—**

Auger, assorted.....	gro. \$2.30
Brad Axl.....	gro. \$1.25
Chisel Handles:	
Apple Tanged Firmer, gro. ass'd.....	\$2.25
Hickory Tanged Firmer, gro. ass'd.....	\$1.75
Apple Socket Firmer, gro. ass'd.....	\$1.70
Hickory Socket Firmer, gro. ass'd.....	\$1.60
Hickory Socket Framing, gro. ass'd.....	\$2.25
File, assorted.....	gro. \$1.50
Hammer, Hatchet, Axe, &c.....	50¢
Hand Saw, Varnished, doz.....	70¢
Not Varnished.....	55¢
Plane Handles:	
Jack doz.....	55¢
Jack Bolted.....	60¢
Fore, doz.....	35¢
Fore, Bolted.....	70¢

**Hangers—**

Barn Door, New Pattern, Round Groove, Regular:	
Inch.....	3
Single Doz.....	\$0.35
Barn Door, New English Pattern, Check Back, Regular:	
Inch.....	3
Single Doz.....	\$1.10

**Chicago Spring Butt Co.**

Friction.....	25¢
Oscillating.....	25¢
Big Twin.....	25¢
Chisholm & Moore Mfg. Co.....	50¢
Baggage Car Door.....	40¢
Elevator.....	40¢
Railroad.....	55¢
Cronk & Carrier Mfg. Co.....	60¢
Roller Bearing.....	60¢
Parlor Ball Bearing.....	\$4.15
Parlor, Standard.....	\$3.35
Parlor, New Model.....	\$3.25
Parlor, New Champion.....	\$2.25
Barn Door, Standard.....	50¢
Covered.....	50¢
Special.....	50¢
Lawrence Bros.....	60¢
Advance.....	60¢
Cleveland.....	60¢
Crown.....	60¢
Giant.....	50¢
New York.....	60¢
Peerless.....	60¢
Sterling.....	60¢
Swing, No. 95.....	50¢
Union, No. 44.....	\$5.00
No. 46.....	\$9.00

**McKinney Mfg. Co.**

No. 1, Special.....	\$15
No. 2, Standard.....	\$18
Hinged Hangers.....	\$16
Meyers' Stayon Hangers.....	50¢
C. S. Smith Mfg. Co.....	50¢
Lundy Farlor Door.....	50¢
Monarch Barn Door.....	50¢
Never Jump Hinge.....	50¢
Peerless.....	60¢
Perfection.....	70¢
Phoenix.....	70¢
Wagner's Adjustable.....	70¢
Warehouse Anti-Friction.....	60¢

**Pioneer Wood Track No. 3.....**

Imp'd Wood Track No. 5.....	\$2.25
Imp'd Steel Track No. 7.....	\$2.25
Imp'd Steel Track No. 7.....	\$2.65
Ball Brg Steel Track No. 9.....	\$2.50
Ball Brg Steel Track No. 10.....	\$2.50
Roller Brg Steel Track No. 11.....	\$2.45
Roller Brg Steel Track No. 12.....	\$2.40
Ball Brg Steel Track No. 13.....	\$2.75
Roller Brg Steel Track No. 14.....	\$2.65
Ball Brg Trolley Track No. 15.....	\$2.65
Ball Brg Trolley Track No. 16.....	\$2.65
Track No. 16.....	40¢
Silent Adjustable Track No. 18.....	40¢
Auto Adjustable Track No. 22.....	40¢
Trolley B. D. No. 17.....	\$1.60
Trolley F. D. No. 120.....	\$2.70
Trolley F. D. No. 121.....	\$2.65
Trolley F. D. No. 151.....	\$3.00
Roller Bearing D. No. 25.....	70¢
Roller Bearing U. S. B. D.....	70¢
Anti Friction B. D.....	60¢
Ives' Wood Track No. 1.....	\$2.15
Ives' Imp'd Wood Track No. 2.....	\$2.15
Stow & Wilcox Mfg. and Foundry Co.....	40¢
Acme Farlor Ball Bearing.....	40¢
Atlas.....	40¢
Badger Barn Door.....	50¢
Baggage Car Door.....	50¢
Climax Anti-Friction.....	50¢

**Elevator.....**

Express.....	40¢
Interstate.....	50¢
Lundy Farlor Door.....	50¢
Matchless.....	50¢
Nansen.....	60¢
Railroad.....	50¢
Street Car Door.....	50¢
Steel, Nos. 300, 404, 500.....	40¢
Stowell Farlor Door.....	50¢
Wild West, Nos. 300, 404, 500.....	50¢
Zeuthen for Wood Track.....	50¢

**Wilcox Mfg. Co.**

Biike Roller Bearing.....	60¢
C. J. Roller Bearing.....	60¢
Cycle Ball Bearing.....	50¢
Dwarf Ball Bearing.....	40¢
Richards' Steel Track.....	60¢
L. T. Roller Bearing.....	60¢
New Era Roller Bearing.....	50¢
O. K. Roller Bearing.....	60¢
Prindle, Wood Track.....	60¢
Richards' Wood Track.....	60¢
Richards' Steel Track.....	60¢
Spencer Roller Bearing.....	60¢
Tandem Nos. 1 and 2.....	60¢
Underwriters' Roller Bearing.....	40¢
Velvet.....	50¢
Wilcox Auditorium Ball Bearing.....	30¢
Wilcox Barn Trolley No. 123.....	40¢
Wilcox Elev. Door, Nos. 12 and 22.....	30¢
Wilcox Elev. Door, No. 132.....	40¢
Wilcox Fire Trolley, Roller Bearing.....	30¢
Wilcox Le Roy Noiseless Ball Bearing.....	40¢
Wilcox O. K. Steel Track.....	50¢
Wilcox O. K. Trolley.....	50¢
Wilcox Trolley Ball Bearing.....	40¢
Wilcox Wideman Narrow Gauge Ball Bearing.....	40¢
For Track, see Rail.....	

**Hangers, Gate—**

Myers' Patent Gate Hangers.....	per doz. \$4.50
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**Hatches—**

Best Brands.....	50¢
Cheaper Brands.....	60¢
Note.....	Net prices often made.

**Hinges—**

Surface Gravity Locking Blind:	
(Victor: National; 1888 O P.....	
Niagara; Clark's O. P.; Clark's Tip: Buffalo.)	
No.....	1
Doz. pair.....	\$0.85
Mortise Shutter:	
(L. & P. O. S. Dixie, &c.)	
No.....	1
Doz. pair.....	\$0.70
Mortise Reversible Shutter, (Buffalo, &c.)	
No.....	1
Doz. pair.....	\$0.75

**North's Automatic Blind Fixtures, No. 2, for Wood, \$9.00; No. 3, for Brick, \$5.50.....**

Parlor.....	70¢
Reading's Gravity.....	75¢
Sargent's, Nos. 1, 3, 5, 11 & 13.....	70¢
Stanley's Steel Gravity Blind Hinges, per doz. sets, without screws, \$0.30.....	
Wrightsville Hardware Co.....	7 & 5¢
O. S. Lull & Porter.....	7 & 5¢
Queen City Reversible.....	7 & 5¢
Stenger's Positive Locking, Nos. 1 & 2.....	7 & 5¢
Shepard's Noiseless, Nos. 60, 65, 70 & 105.....	70¢

**Niagara Gravity Locking, Nos. 1, 3 & 5.....**

1888, Old Pat'n, Nos. 1, 3 & 5.....	70¢
Tip Pat'n, Nos. 1, 3 & 5.....	70¢
Buffalo Gravity Locking, Nos. 1, 3 & 5.....	70¢
Sneepard's Double Locking, Nos. 21 & 25.....	70¢
Champion Gravity Locking, No. 75.....	75¢
Stranboast Gravity Locking, No. 10.....	75¢
Pioneer, Nos. 100, 45 & 55.....	75¢
Empire, Nos. 101 & 103.....	70¢
W. H. Co.'s Mortise Gravity Locking, No. 2.....	60¢

**Gate Hinges—**

Clark's or Shepard's - Doz. sets:	
No.....	1
Hinges with Latches.....	\$2.00
Hinges only.....	\$1.50
Latches only.....	70¢

**New England.....**

Without Latch.....	doz. \$2.50
With Latch.....	doz. \$1.80
Reversible Self-Closing.....	doz. \$1.80
Without Latch.....	doz. \$1.45
With Latch.....	doz. \$1.30
Without Latch.....	doz. \$1.20

**Wrightsville Hardware Co.**

Shepard's or Clark's, doz. sets, No. 1.....	2
Hinges with Latches.....	\$1.00
Hinges only.....	1.40
Latches only.....	70¢

**Spring Hinges—**

Holdback, Cast Iron, gro. \$9.50.....	doz. \$7.50
Non-Holdback, Cast Iron, gro. \$7.....	doz. \$7.50

**J. Bardsley**

Bardsley's Patent Cheeking.....	15¢
Bommer Bros.....	40¢
Bommer Ball Spring Floor Hinges.....	40¢
Chicago Spring Butt Co.....	25¢
Chicago Spring Hinges.....	25¢
Triple End Spring Hinges.....	50¢
Chicago (Ball Bearing) Floor Hinge.....	15¢
Garden City Engine House.....	25¢
Kremer's Salsoon Door.....	25¢
Columbian Hdw. Co.....	30¢
Acme, Wrt. Steel.....	20¢
Acme, Brass.....	20¢
American.....	30¢
Columbia, No. 14.....	gr. \$9.00
Columbia, No. 18.....	gr. \$25.00
Columbia, Adjustable, No. 7.....	gr. \$12.00

**Wrought Iron Hinges—**

Strap and T Hinges, &c., list Mar 15, 1901:	
Light Strap Hinges.....	70¢
Heavy Strap Hinges.....	75¢
Light T Hinges.....	65¢
Heavy T Hinges.....	60¢
Extra Heavy T Hinges.....	75¢
Hinge Hasps.....	55¢
Cor. Heavy Strap.....	75¢
Cor. Ex. Heavy T.....	75¢
Screw Hook.....	1 1/2 to 2 in. 1b. 34¢
Strap.....	2 1/2 to 3 in. 1b. 5 c
Screw Hook and Eye.....	1/4 to 1 inch 1b. 5 c
1/2-inch.....	1b. 6 c
3/4-inch.....	1b. 7 c

**Miscellaneous—**

Hoffman's Steel Spring Butt Hinges.....	40¢
Hoffman's Offset Refrigerator Hinges.....	40¢
Hitchers, Stall—	
Covert Mfg. Co., Stall Hitchers.....	35¢

**Hods, Coal—**

Galv. Open.....	15
Jap. Open.....	16
Galv. Funnel.....	17
Jap. Funnel.....	18

**Masons, Etc.—**

Cleveland Wire Spring Co.: Steel Mortar.....	each \$1.45
Steel Brick.....	each \$1.10
Hoffman's: Brick.....	each \$1.10
Masons'.....	each \$2.00
Plasterers.....	each \$3.20

**Hoes—Eye—**

Seovil and Oval Pattern.....	60¢
Grub, list Feb. 25, 1899.....	70¢

**Handled—**

Aug. 1, 1899, List:	
Garden.....	70¢
Meadow & Rhode Island.....	75¢
Southern Meadow.....	75¢
Mortar and Street.....	75¢
Planters', Regular Pat'n.....	70¢
Cotton.....	75¢
Toy, Ladies', Boys', Onion, Turnip, Berry or Tobacco.....	70¢

**Hoisting Apparatus—**

See Machines, Hoisting.	
Holders—	
Angular, per doz.....	\$24.00
Door—	
Empire.....	50¢

**File and Tool—**

Nicholson's File Holders and File Handles.....	35¢
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**Hooks—Cast Iron—**

Bird Cage, Reading.....	60¢
Bird Cage, Sargent's List.....	60¢
Ceiling, Sargent's List.....	40¢
Clothes Line, Hoffman's.....	40¢
Clothes Line, Reading List.....	40¢
Clothes Line, Sargent's List.....	40¢
Coat and Hat, Sargent's List.....	45¢
Clothes Line, Stowell's.....	70¢
Coat and Hat, Stowell's.....	70¢
Coat and Hat, Reading.....	70¢
Coat and Hat, Wrightsville.....	65¢
Harnes, Hoffman.....	per doz. \$35.00
Harnes, Reading List.....	70¢

**Wire—**

Belt.....</
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**Wire Coat and Hat:**  
Acme.....60¢  
H. B.....60¢  
V Brace, Chief and Caesar.....60¢  
Gem.....60¢  
Bright Wire Goods—See Wire.

**Wrought Iron—**  
Box, 6 in., per doz. \$1.00; 8 in., \$1.25;  
10 in., \$2.50.  
Cotton.....doz. \$1.05@1.25  
Wrought Staples, Hooks, &c.—  
See Wrought Goods.

**Miscellaneous—**  
Bush, Light, doz. \$5.50; Medium,  
\$6.00; Heavy, \$6.50  
Grass.....Nos. 1 2 3 4  
Best.....\$1.50 1.75 2.00  
Common.....\$1.30 1.50 1.60  
Potato and Manure.....66¢@70¢  
Whiffletree.....lb. 5¢@6¢  
Hooks and Eyes:  
Brass.....60¢@10¢@10¢@70¢  
Malleable Iron.....70¢@50¢@70¢@10¢  
Covert Saddlery Works' Self Locking  
Gate and Door Hook.....60¢  
Ft. Madison Cut-Easy Corn Hooks,  
per doz. \$5.35 net  
Crown Picture.....50¢@10¢  
Bench Hooks—See Bench Stops.  
Corn Hooks—See Knives, Corn.

**Horse Nails—See Nails, Horse**  
**Horsehoes—**  
See Shots, Horse.

**Hose Rubber—**  
Garden Hose, 3/4-inch:  
Competition.....ft. 1/4¢@1/4¢  
3-ply Standard.....ft. 6¢@6¢  
4-ply Standard.....ft. 7¢@8¢  
3-ply Extra.....ft. 8¢@9¢  
4-ply Extra.....ft. 10¢@11¢  
Cotton Garden, 3/4-in., coupled:  
Low Grade.....ft. 6¢@7¢  
Fair quality.....ft. 8¢@9¢

**Irons— Sad—**  
From 1 to 10.....lb. 2¢@3¢  
B. B. Sad Irons.....lb. 3¢@4¢  
Chinese Laundry.....lb. 4¢@5¢  
Chinese Sad.....lb. 3¢@4¢  
Mrs. Potts', per set:  
Nos. 50 55 60 65  
Jap'd Tops.....7¢ 7 1/2 8 1/2 8 1/2  
Tin'd Tops.....7 1/2 7 1/2 8 1/2 8 1/2  
New England Pressing, lb. 3/4¢@3/4¢

**Pinking—**  
Pinking Irons.....doz. 50¢@60¢  
**Soldering—**  
Soldering Coppers 2 1/2 and 3.....18¢@19¢  
1 1/2 and 2.....20¢@21¢  
Covert Mfg. Co.....20¢@21¢

**Jacks, Wagon—**  
Covert Mfg. Co.:  
Auto Screw.....30¢@5¢  
Steel.....30¢@5¢  
Covert's Saddlery Works.....60¢@10¢  
Daley.....60¢@10¢  
Victor.....60¢@10¢  
Lockport.....30¢  
Lane's Steel.....30¢@10¢

**Kettles—**  
Brass, Spun, Plain.....20¢@25¢  
Enamelled and Cast Iron—See Ware,  
Hollow.

**Knives—**  
Butcher, Kitchen, &c.—  
Foster Bros' Butcher, &c.....30¢  
Hartell Cutlery Co.....40¢  
Smith & Hemenway Co.....40¢@10¢  
Hay and Straw—See Hay Knives.

**Corn—**  
Withington Acme, per doz., \$2.65; Dent,  
\$2.75; Adj. Serrated, \$2.20; Ser-  
rated, \$2.10; Yankee No. 1, \$1.50;  
Yankee No. 2, \$1.15.

**Drawing—**  
Standard List.....70¢@70¢@10¢  
Bradley's.....1 2 3 4 5 6 7 8 9 10  
C. E. Jennings & Co. Nos. 45, 46, 60¢@10¢  
Jennings & Griffin, Nos. 51, 52, 60¢@10¢  
Swan's.....70¢@10¢@24¢  
Watrous.....16¢@10¢  
L. & J. White.....20¢@25¢

**Hay and Straw—**  
Lightning.....per doz. \$6.50@7.00  
Iwan's Sickle Edge.....per doz. \$10.00  
Iwan's Serrated.....per doz. \$10.00  
Maine.....per doz. \$8.50

**Mincing—**  
Buffalo.....per gro. \$13.00

**Miscellaneous—**  
Farriers.....doz. \$2.00@3.00  
Wostenholme's.....per doz. \$3.00@3.25

**Knobs—**  
Base, 2 1/4-inch, Birch, or Maple,  
Rubber tip, gro.....\$1.10@1.20  
Carriage, Jap. all sizes, gro. 25¢@50¢  
Door, Mineral.....doz. 60¢@70¢  
Door, Por. Jap'd.....doz. 60¢@75¢  
Door, Por. Nickel.....doz. \$2.05@3.15  
Bardley's Wood Door, Shutter, &c., 15¢  
Picture, Sargent's.....60¢@10¢

**Lacing Leather—**  
See Belting Leather.

**Ladders Step Etc.—**  
Lane's Store.....25¢  
Myers Noiseless Store Ladders.....50¢

**Ladies— Melting—**  
L. & O. Mfg. Co.....25¢  
P. S. & W.....50¢  
Reading.....60¢  
Sargent's.....45¢@10¢

**Lanterns— Tubular—**  
Regular Tubular No. 0, doz. \$4.55@4.75  
Lift Tubular, No. 0, doz. \$4.75@5.25  
Hinge Tubular, No. 0, doz. \$4.75@5.25  
Other Styles.....40¢@10¢@10¢@5¢

**Bull's Eye Police—**  
No. 1, 2 1/2 inch.....\$2.50@2.75  
No. 2, 3 inch.....\$2.75@3.00

**Latches— Gate—**  
Hoffman's Safety Gate.....per doz. 60¢

**Thumb—**  
Roggin's Latches, with screw, doz. \$5.00@5.00

**Leaders— Cattle—**  
Small.....doz. 55¢; large, 60¢  
Covert Mfg. Co.....15¢@25¢

**Lifters, Transom—**  
R. & E.....33¢@35¢

**Linos—**  
Wire Clothes, Nos. 13 19 20  
100 feet.....\$2.20 1.00 1.65  
75 feet.....1.80 1.70 1.30

**Crown Solid Braided Chalk.....33¢@35¢**  
Mason's, No. 0 to No. 5.....33¢@35¢  
Samson Cordage Works:  
Solid Braided Chalk, No. 0 to 3.....40¢  
Silver Lake Braided Chalk, No. 0, 60, 00;  
No. 1, \$6.50; No. 2, \$7.00; No. 3, \$7.30;  
Anniston Waterproof Clothes, 50 lb., \$  
gro. \$22.00; Gilt Edge, \$20.00; Air Line,  
\$20.00; Acme, \$15.00; Alabama, \$15.00;  
Empire, \$13.50; Advance, \$13.50; All-  
ston, \$11.50; Calhoun, \$10.00; Oriole,  
\$20.00; Albermarle, \$25.50; Eclipse,  
\$11.00; Chicago, \$10.00; Standard,  
\$9.00; Columbia, \$8.00.

**Locks— Cabinet—**  
Cabinet Locks.....33¢@35¢@75¢

**Door Locks, Latches, &c.—**  
[Not prices are very often made on  
these goods.]

**Reading Hardware Co.....50¢**  
R. & E. Mfg. Co.....40¢  
Sargent & Co.....40¢@40¢@10¢

**Elevator—**  
Stowell's.....40¢

**Padlocks—**  
Wrought Iron.....7¢@10¢@5¢@80¢@5¢  
R. & E. Mfg. Co. Wrt. Steel and Brass.....75¢@75¢@10¢

**Sash, &c.—**  
Ives' Patent.....55¢@75¢  
Bronze and Brass.....50¢  
Crescent.....50¢  
Iron.....60¢@25¢  
Wrought Bronze and Brass.....50¢@5¢  
Wrought Steel.....35¢  
Reading.....60¢@10¢@10¢@70¢

**Machines— Boring—**  
Com., Upright, Without Augers, \$2.00  
Com., Angular, Without Augers, \$2.25  
Without Augers.  
R. & E. Mfg. Co.: Upright, Angular,  
Improved No. 3, \$4.25 No. 1, \$5.00  
Improved No. 4, 3.75 No. 2, 3.38  
Improved No. 5, 2.75 No. 3, 3.50  
Jennings' No. 4, 3.15 No. 1, 3.50  
Miller's Falls.....5.75  
Snell's, Rice's Pat. 2.50 2.75

**Holisting—**  
Moore's Anti-Friction Differential Pul-  
ley Block.....30¢  
Moore's Hand Hoist with Lock Brake, 20¢  
Moore's Portable Pneumatic Hoist.....25¢

**Ice Cutting—**  
Chandler's.....15¢@10¢

**Washing—**  
Boss Washing Machine Co.: Per doz.  
Boss No. 1; Boss Rotary.....\$57.00  
Boss No. 7; Dietz Rotary.....\$60.00  
Champion Rotary; Banner No. 1.....\$54.00  
Standard Champion No. 1.....\$48.00  
Standard Perfection.....\$36.00  
Cinti Square Western.....\$30.00  
Unedea American, Round.....\$29.00

**Mallets—**  
Hickory.....45¢@50¢  
Lignumvite.....45¢@50¢  
Tinners', Hickory and Applewood,  
doz.....50¢@50¢

**Door—**  
Elastic Steel (W. G. Co.).....10¢

**Mattocks—**  
See Picks and Mattocks.

**Menders Hose**  
Robinson's Hose Menders.....per gro. \$2.00

**Milk Cans—See Cans, Milk**

**Mills— Coffee, etc.—**  
Enterprise Mfg. Co.....25¢@30¢  
Hoffman's Side, Coffee and Spice.....per doz. \$1.25

**National, list Jan. 1, '94.....30¢**  
Parker's Columbia & Victoria.....50¢@10¢@5¢  
Parker's Box and Side.....50¢@10¢@5¢  
Swift, Lane Bros Co.....30¢

**Mowers, Lawn—**  
Net prices are generally quoted.  
Cheap.....all sizes, \$1.90@1.95  
Good.....all sizes, \$2.25@2.50

**High Grade 4.25 4.50 4.75 5.00**  
Continental.....60¢@10¢  
Great American.....7¢  
Quaker City.....60¢@10¢  
Pennsylvania.....60¢@10¢  
Pennsylvania Ball Bearing.....60¢@5¢  
Pennsylvania Golf.....50¢  
Pennsylvania Horse.....40¢  
Pennsylvania Pony.....45¢  
Philadelphia:  
Style M., S. C., K., T.....70¢@10¢  
Style A, all Steel.....60¢@10¢  
Style E, High Wheel.....70¢@10¢  
Drexel and Gold Coin, low list.....50¢@5¢

**Nails—**  
Cut and Wire. See Trade Report.  
Wire Nails and Brads, Papered.  
List July 20, 1899.....85¢@10¢@10¢@5¢@10¢@10¢

**Hungarian, Finishing, Upholster-  
ers', &c. See Tacks.**

**Horse—**  
Nos. 6 7 8 9 10  
A. C.....50¢ 25¢ 25¢ 21¢ 21¢.....40¢@5¢  
Ausable.....28¢@25¢ 25¢ 24¢ 23¢.....50¢@10¢  
C. B. K.....25¢ 25¢ 25¢ 21¢ 21¢.....40¢  
Champion.....28¢ 25¢ 25¢ 24¢ 23¢.....40¢@10¢  
Clinton.....19¢ 17¢ 16¢ 15¢ 14¢.....30¢@10¢  
Maud S.....25¢ 25¢ 25¢ 21¢ 21¢.....50¢  
Putnam.....25¢ 21¢ 20¢ 19¢ 18¢.....35¢@5¢

**Putnam**  
Cold Roll'd 19¢ 18¢ 17¢ 16¢.....10¢@10¢  
American, Nos. 5 to 10 per lb.....9¢@9¢  
Neponset.....Nos. 5 to 10 per lb.....12¢  
Jobbers' special brands.....per lb. 8¢@9¢

**Picture**  
1 1/2 2 2 1/2 3 3 1/2 in.  
Brass Head.....45¢ 60¢ 70¢ 95¢ 1.00 gro.  
Por. Head.....1.10 1.10 1.10.....gro.  
Crown Picture Nails.....per gro. \$1.50

**Nippers, See Pliers and Nippers.**

**Nuts—**  
Cold Punched: Off list.  
Mfrs. or U. S. Standard.....\$1.50

**Square, plain.....\$1.50**  
Hexagon, plain.....\$1.50

**Square, C. T. & R.....\$1.70**  
Hexagon, C. T. & R.....\$1.50

**Hot Pressed:**  
Mfrs., U. S. or Nar. Gauge Stan'd.  
Square Blank.....\$1.50

**Hexagon Blank.....\$1.50**  
Square Tapped.....\$1.50

**Hexagon Tapped.....\$1.50**

**Oakum—**  
Best or Government.....lb. 6¢@4¢

**Navy.....lb. 4¢@4¢**  
U. S. Navy.....lb. 5¢@4¢

**Plumbers' Spun Oakum.....\$1.50**  
In carload lots 1/4 lb. off f.o.b. New  
York.

**Oil Tanks—See Tanks, Oil.**

**Oilers—**  
Brass and Copper.....65¢@65¢@10¢

**Tin or Steel.....70¢@10¢@75¢**  
Zinc.....75¢@75¢@10¢

**Chase or Paragon.....65¢@65¢@10¢**  
Brass and Copper.....65¢@65¢@10¢

**Tin or Steel.....75¢@75¢@10¢**  
Zinc.....75¢@75¢@10¢

**Malleable, Hammers' Improved, No. 1,  
\$3.60; No. 2, \$4; No. 3, \$4.40 per doz. 20¢**

**Malleable, Hammers' Old Pattern,  
same list.....50¢@10¢**

**American Tube & Stamping Co.:  
Spring Bottom Cans.....70¢@70¢@10¢**

**Railroad Oilers etc.....60¢@60¢@10¢**

**Openers— Can—**  
French.....doz. 55¢

**Iron Handle.....doz. 25¢@27¢**  
Sprague, Iron Hdl.....per doz. 35¢@40¢

**Sardine Scissors.....doz. \$1.75@3.00**  
Marvel.....per doz. \$1.25

**National.....50¢**  
Stowell's.....per doz. 35¢@45¢

**Tip Top.....per doz. \$0.75**

**Egg—**  
Nickel Plate.....per doz., \$2.25

**Silver Plate.....per doz., \$3.50**

**Packing—**  
Asbestos Packing, Wick and Rope,  
15¢@15¢@10¢

**Rubber—**  
Sheet, C. I.....8¢@12¢

**Sheet, C. O. S.....9¢@15¢**  
Sheet, C. B. S.....10¢@14¢

**Sheet, Pure Gum.....50¢@70¢**  
Sheet, Red.....55¢@40¢

**Jenkins' Standard, 2 1/2 80¢.....25¢@25¢**

**Miscellaneous—**  
American Packing.....7¢@10¢

**Cotton Packing.....15¢@15¢**  
Italian Packing.....9¢@12¢@10¢

**Jute.....3¢@10¢@10¢**  
Russia Packing.....7¢@10¢@10¢

**Pails— Creamery**  
S. S. & Co., with gauges, No. 1 \$6.25;  
No. 2, \$6.50 per doz.

**Galvanized—**  
Price per doz.  
Quart.....10 12 14

**Water, Regular.....1.75 2.00 2.25**  
Water, Heavy.....2.75 3.00 3.25

**Fire, Rd. Bottom.....2.30 2.60 2.90**  
Well.....2.35 2.60 2.75

**Pans— Dripping—**  
Standard List.....60¢@5¢@60¢@10¢

**Fry—**  
Common Lipped:  
No. 1 2 3 4 5  
Per doz. \$0.95 1.05 1.15 1.30 1.65

**Roasting and Baking—**  
Reval, S. S. & Co., per doz., Nos. 5, \$4.50;  
No. 10, \$5.25; No. 25, \$7.50; No. 30, \$6.25.

**Simplex, per doz.:  
No. 30 60 80 140 150 160  
\$2.75 3.25 3.75 3.00 3.25 4.00**

**Paper—Building Paper—**  
Asbestos.....lb.  
Building Felt.....2¢@4¢

**Mill Board, sheet, 40 x 40 inches 5¢@6¢**  
Mill Board, roll, thicker than 1-16  
inch.....3¢@4¢

**Mill Board, roll, 1-16 in. thick and  
less.....2¢@4¢**

**Rosin Sized Sheathing: 500 sq. ft.  
Light wt., 25 lbs. to roll, \$0.45@0.50**

**Medium wt., 30 lbs. to roll, \$0.58@0.65**  
Heavy wt., 40 lbs. to roll, \$0.68@0.75

**Medium Grades Water Proof  
Sheathing.....\$0.65@1.25**

**Deafening Felt, 9, 6 and 1 1/2 sq. ft.  
to lb., ton.....\$1.50**

**Red Rope Roofing, 250 sq. feet per  
roll.....\$1.65**

**NOTE—These goods are often sold at  
delivered prices.**

**Tarred Paper.**  
1 ply (roll 300 sq. ft.), ton.....\$32.50@35.00

**2 ply, roll 198 sq. ft., ton.....60¢@65¢**  
3 ply, roll 108 sq. ft., ton.....85¢@87¢

**Slater's Felt (roll 500 sq. ft.).....75¢**

**NOTE—Above prices often include de-  
livery.**

**R. R. M. Stone Surface Roofing (roll  
110 sq. ft.).....\$2.75**

**Sand and Emery—**  
Flint.....60¢@60¢@10¢

**Garnet.....25¢@20¢@15¢**

**Parers— Apple—**

**Advance.....per doz. \$4.50**  
Baldwin.....per doz. \$5.00

**Bonanza Improved.....each \$0.50**  
Dandy.....each \$7.50

**Eureka Improved.....each \$20.00**  
Family Bay State.....per doz. \$15.00

**Improved Bay State.....per doz. \$36.00**  
New Lightning.....per doz. \$7.50

**Reading 73.....per doz. \$4.00**  
Reading 78.....per doz. \$7.00

**Turn Table 78.....per doz. \$6.75**  
White Mountain.....per doz. \$6.00

**Potato—**  
Saratoga.....per doz. \$7.00

**White Mountain.....per doz. \$6.00**

**Paris Green—**  
Less than 1 ton.....per lb.  
Arsenic kegs or casks.....12¢@10¢

**Kits, 14, 25, 55 lbs.....33¢**  
Paper boxes, 2 to 5 lbs.....21¢

**Paper boxes, 1 lb.....14¢@6¢**  
Paper boxes, 1/4 lb.....16¢

**Paper boxes, 1/2 lb.....16¢**  
1 to 5 tons, 1 cent per lb. less; 5 tons  
and over, 1 1/2 cents per lb. less.

**Picks and Mattocks—**  
List Feb. 23, 1899.....65¢@10¢@70¢

**Pinking Irons—**  
See Irons, Pinking.

**Pins— Escutcheon—**  
Brass.....60¢@60¢@10¢

**Iron, list Nov. 11, '85.....60¢@60¢@10¢**

**Pipe, Cast Iron Soil—**  
Standard, 2-6 in.....50¢@10¢

**Extra Heavy, 2-6 in.....65¢**  
Fittings.....70¢

**Pipe, Merchant,  
Steel or Iron, Carload Lots,  
f.o.b. Pittsburgh. Galva-  
nized, 16, 14, 12 inch.....68¢**

**14-inch.....70¢**  
12-inch.....70¢

**7 to 12 inch.....75¢**  
Less than carloads, 12 1/4¢ advance.

**Pipe Sewer—**  
Jobbers' Prices—

**Standard Pipe and Fittings, 2 to 24 in.  
New England.....70¢**

**New York and New Jersey.....75¢**  
Maryland, Delaware, East Penn.....75¢

**West Penn and West Va.....75¢**  
Virginia.....75¢

**Ohio, Michigan and Ky.....75¢**  
Carload lots are generally delivered.

**Pipe, Stove—**  
Edwards' Nested Stove Pipe:  
C. L. L. C. L.

**5 in., per 100 joints.....\$7.50 \$8.50**  
6 in., per 100 joints.....8.00 9.00

**7 in., per 100 joints.....9.00 10.00**

**Planes and Plane Irons—**  
Wood Planes—

**Bench, First quality.....40¢@5¢@10¢@10¢**  
Bench, Second qual.....50¢@5¢@10¢@10¢

**Molding.....35¢@5¢@10¢@10¢**  
Bailey's (Stanley R. & Co.) 5¢@10¢@25¢@10¢@10¢

**Chapin-Stephens Co.:  
Bench, First Quality.....40¢@40¢@10¢**

**Bench, Second Quality.....50¢@50¢@10¢**  
Molding.....35¢@5¢@10¢@10¢

Stanley's Duplex..... 20@20&10&10¢  
Woods' Extension..... 33&4¢

**Poachers, Egg—**  
Buffalo Steam Egg Poachers, # doz.  
No. 1, \$6.00; No. 2, \$4.00; No. 3,  
\$4.00; No. 4, \$12.00..... 50¢

**Points, Glaziers—**  
Bulk and 1 lb. papers..... 1b. 5¢@  
1/2 lb. papers..... 1b. 9¢@  
1/4 lb. papers..... 1b. 9¢@

**Pokes, Animal—**  
Ft. Madison Hawkeye..... # doz. \$3.25  
Ft. Madison Western..... # doz. \$4.00

**Police Goods—**  
Manufacturers' Lists..... 25@25&5¢  
Tower's..... 25¢

**Polish—Metal—**  
Prestoline Liquid, No. 1 (1/2 pt.), # doz.  
\$3.00; No. 2 (1 qt.), \$9.75..... 40¢  
Prestoline Paste..... 40&10¢  
George William Hoffman:  
U. S. Metal Polish Paste, 3 oz. boxes, #  
doz. 50¢; # gr. \$4.50; 1/2 lb boxes, #  
doz. \$1.25; 1 lb boxes, # doz. \$2.25  
U. S. Liquid, 5 oz. cans, # doz. \$1.25;  
# gr. \$12.00  
Barkeepers' Friend Metal Polish, # doz.  
\$1.75; # gr. \$18.00  
Wynn's White Silk, 1/2 pt. cans, #  
doz..... \$2.00

**Stove—**  
Black Eagle Benzine Paste, 5 lb cans.....  
# doz. 10¢  
Black Eagle, Liquid, 1/2 pt. cans, # doz. 75¢  
Black Jack Paste, 1/2 pt. cans, # doz. 75¢  
Ladd's Black Beauty, # gr. \$10.00..... 50¢  
Joseph Dixon's, # gr. \$3.75..... 10¢  
Dixon's Plumbago..... # gr. \$2.50  
Firestone, # gr. \$4.50..... 10¢  
Japanese, # gr. \$3.50..... 30¢  
Jet Black..... # gr. \$3.50  
Peerless Iron Enamel, 1/2 pt. cans.....  
# doz. \$1.50

**Wynn's:**  
Black Silk, 5 lb. ball..... each 70¢  
Black Silk, 1/2 lb. box..... # doz. \$1.00  
Black Silk, 5 oz. box..... # doz. \$0.75  
Black Silk, 1/2 pt. liq..... # doz. \$1.00

**Poppers, Corn—**  
1 qt., Square..... gro. \$9.00  
1 qt., Round..... gro. \$10.00  
1 1/2 qt., Square..... gro. 11.00  
2 qt., Square..... gro. 13.00

**Post Hole and Tree Augers and Diggers—**  
See also Diggers, Post Hole, &c.

**Posts, Steel—**  
Steel Fence Posts, each, 5 ft., 42¢; 6  
ft., 46¢; 6 1/2 ft., 48¢  
Steel Hitching Posts, each..... \$1.30

**Potato Parers—**  
See Parers, Potato.

**Pots—Glue—**  
Enameled..... 40¢  
Tinned..... 5¢

**Powder—**  
In Cans:  
Duck 1 lb. each..... 45¢  
Fine Sporting, 1 lb. each..... 75¢  
Rifle, 1/2 lb. each..... 15¢  
Rifle, 1 lb. each..... 25¢  
King's Semi-Smokeless:  
Keg (25 lb bulk)..... \$6.50  
Half Keg (12 1/2 lb bulk)..... \$3.50  
Quarter Keg (6 1/4 lb bulk)..... \$1.90  
Case 24 (1 lb cans bulk)..... \$8.50  
Half case (1 lb cans bulk)..... \$4.50  
King's Smokeless:  
Keg (25 lb bulk)..... \$12.00 \$15.00  
Half Keg (12 1/2 lb bulk) 6.25 7.75  
Quarter Keg (6 1/4 lb bulk) 3.25 4.00  
Case 24 (1 lb cans bulk) 14.00 17.00  
Half case 12 (1 lb cans blik) 7.25 8.75  
Robin Hood Shot Gun..... 50&20¢

**Preserves—**  
**Fruit and Jelly—**  
Enterprise Mfg. Co..... 20@25¢  
Sensible..... 35¢  
2 qt., \$2.00; 4 qt., \$3.00; 10 qt., \$6.00 each.  
**Seal Preserves—**  
Morrill's No. 1, per doz. \$20.00..... 50¢  
Morrill's No. 2, per doz. \$22.50..... 50¢

**Pruning Hooks and Shears—See Shears.**

**Pullers Nail—**  
Cyclops..... 50¢  
Miller's Falls, No. 3, per doz. \$12.00.....  
33&10¢

Pearson No. 1, Cyclone Spike Puller,  
each \$57.50..... 50¢  
Pelican, # doz. \$20.00..... 40&10¢  
Scranton, Case Lots:  
No. 1 (large), # doz. \$6.50; No. 2 (large),  
\$5.75; No. 3 (small), \$5.00; No. 2-B (large),  
\$5.50; No. 2-B (small), \$4.00; No. 2-D  
(large), \$4.50; No. 2-D (small) \$4.00.  
Smith & Hemenway Co.:  
Ajax..... 60¢  
Diamond B. No. 3, case lots, # doz. \$5.00  
Diamond B. No. 3, case lots, # doz. \$5.00  
Eureka..... 30¢  
Giant, No. 1, # doz. \$18; No. 2, \$16.50;  
No. 3, \$15..... 40¢  
Yankee..... 60&5¢

**Pulleys—Single Wheel—**  
Inch..... 2 1/4 3  
Awning, # doz. \$0.50 .75 1.00  
Hay Fork, Swivel or Solid Eye.....  
# doz. 4 in., \$0.95; 5 in., \$1.25  
Inch..... 3 1/4 4 1/2  
Hot House, # doz. \$0.60 .80 1.10  
Inch..... 1 1/4 1 3/4 2  
Screw, # doz. \$0.14 .17 .20 25¢  
Inch..... 1 1/4 1 3/4 2  
Side, # doz. \$0.27 .35 .45 .55  
Inch..... 1 1/4 1 3/4 2  
Tackle, # doz. \$0.37 .57 .60 .80  
Towell's:  
Ceiling or End, Anti-Friction..... 60¢  
Dumb Walter, Anti-Friction..... 60&10¢  
Hay Fork, Anti-Friction, 5-in. Wheel.....  
# doz. \$12.00..... 50¢  
Electric Light  
Side, Anti-Friction..... 90&10¢

**Sash Pulleys—**

**Common Frame: Square or Round**  
End, per doz., 1 1/4 in., 13c.; 2 in., 16c  
Auger Mortise, no Face Plate, per  
doz. 1 1/4 in., 12c.; 2 in., 15c.  
Auger Mortise, with Face Plate, per  
doz., 1 1/4 in., 13c.; 2 in., 15 1/2c.  
Acme..... 1 1/4 in., 16c.; 2 in., 19¢  
Common Sense, 1 1/4 in..... # doz. 15¢;  
2 in., 20¢  
Fox-All-Steel, Nos. 3 and 7, 1 1/4 in., # doz. 25¢  
No. 9, 1 1/4 in..... # doz. 20¢  
Extra for Plated Finish..... # doz. 20¢  
Extra for Anti-Friction Bronze  
Bushing..... # doz. 10¢  
Grand Rapids All Steel Noiseless..... 50¢  
Ideal No. 13..... 1 1/4 in., # doz. 19¢  
Niagara..... 1 1/4 in., 16c.; 2 in., 19¢  
No. 26, Troy..... 1 1/4 in., 14 1/2c.; 2 in., 16 1/2c.  
Star..... 1 1/4 in., 16c.; 2 in., 19¢  
Tackle Blocks—See Blocks.

**Pumps—**  
Cistern..... 60@60&10¢  
Pitcher Spout..... 75¢@10&80¢  
Wood..... 50@50&10¢  
Pump Leathers, Lower and Plunger  
Valves—Per gro.:  
Inch. 2 2 1/2 3 3 1/2 4 4 1/2  
\$2.20 2.50 2.75 3.00  
Inch. 3 3 1/2 3 3/4 4 4 1/2  
\$3.30 3.60 3.85 4.10 4.40  
Barnes Dub. Acting (low list)..... 50¢  
Contractors' Rubber Diaphragm No. 2  
B. & L. Block Co. \$15.00  
Flint & Walling's Fast Mail (low list) 55¢  
Flint & Walling's Pitcher Spout..... 75¢  
Loud's Suction Pumps, U. H. Co..... 20¢  
Myers' Pumps, low list..... 50¢  
Myers' Power Pumps..... 50¢  
Daisy Spray Pump..... # doz. \$7.50  
Myers' Spray Pumps..... 50&10¢

**Punches—**  
Saddlers' or Drive, good, # doz. 65@70¢  
Spring, single tube, good quality.....  
\$1.75@1.00  
Revolving (tubes)..... # doz. \$3.75@4.00  
Bemis & Call Co.'s Cast Steel Drive..... 50¢  
Bemis & Call Co.'s Check..... 50¢  
Bemis & Call Co.'s Spring..... 50¢  
Morrill's No. 1 (A. B. C.), # doz. \$15.00..... 50¢  
No. 2, # doz. \$22.50..... 50¢  
No. 2, Metal, # doz. \$45.00..... 50¢  
Bench Punch, each, \$40.00..... 30¢  
Niagara Follow Punches..... 40¢  
Niagara Solid Punches..... 50&10¢  
Steel Screw, B. & K. Mfg. Co..... 40¢  
Tinnars' Hollow, P. S. & W. Co. 35&35&5¢  
Tinnars' Solid, P. S. & W. Co., # doz.....  
\$1.44..... 60¢

**Rail—Barn Door, &c.—**  
Cast Iron, Barn Door: Flange Screw  
Holes for Ed. Groove Wheels:  
1/2 5/8 3/4 In.  
\$1.70 \$2.10 \$3.00 100 feet.  
Angular for Sq. Groove Wheels:  
Small, Med. Large.  
\$1.00 1.25 2.70 100 feet.  
Sliding Door, Brazen Wrought Iron, 6 1/2c  
Sliding Door, Iron Painted..... 2 1/2@3¢  
Sliding Door, Wrought Brass, 1/4  
in..... 10.50¢  
Allitt Mfg. Co. Reliable Hanger Track..... 10¢  
Cronk's Double Braced Steel Rail, 3  
foot..... 3 1/2¢  
Cronk's O. N. T. Rail..... 3 1/4¢  
Lance's, \$4.90; 1 1/2 inch, \$4.85.  
Lance's Standard, # 100 ft..... 3.75  
Lawrence Bros., New York..... # ft. 4 1/4¢  
McKinney's Hinged Hanger Rail..... 3 1/4¢  
foot, 11¢  
McKinney's None Better..... # ft. 3 1/4¢  
McKinney's Standard..... # ft. 4 c  
Myers' Stayon Track..... 50&10¢  
Smith's Wrought Bracket, Plain..... 30¢  
Smith's Special..... 3 1/4¢  
Smith's Never Jump, per ft. 11¢  
Smith's Plain Steel..... 30¢  
Stowell's Cast Rail..... 4 1/4¢  
Stowell's Steel Rail, Plain..... 25¢  
Stowell's Wrought Bracket, Plain..... 3 1/4¢  
Swett's Hylor, per ft. 11¢  
Swett's P. L. B. Steel Rail, # 100 ft. \$3.00

**Rakes—**

**Net Prices, Malleable Rakes:**  
10 12 14 16-tooth  
Shank..... \$1.50 1.60 1.75 1.85  
Socket..... \$1.65 1.80 1.95 2.10  
Steel, August 1, 1899, List..... 70&5¢20¢  
Malleable..... 70¢@10¢75¢  
Lawn Rakes, Metal Head, per doz:  
20 teeth..... \$3.25@3.50  
24 teeth..... \$3.60@3.75  
Fort Madison Red Head Lawn..... \$3.25  
Fort Madison Blue Head Lawn..... \$3.00  
Jackson Lawn, 20 and 30 teeth, # doz \$4.00  
Kohler's:  
Lawn Queen, 20-tooth, # doz..... \$3.45  
Lawn Queen, 24-tooth, # doz..... \$3.60  
Paragon, 20-tooth, # doz..... \$2.75  
Paragon, 24-tooth, # doz..... \$3.00  
Steel Garden, 14-tooth, # doz..... \$2.98  
Malleable Garden, 14-tooth, # doz. \$2.90

**Rasps, Horse—**

Diaston's..... 75¢  
Heller Bros..... 50&10¢30&10¢  
McCafferty's American Standard.....  
60&10¢50¢  
New Nicholson..... 70&10¢  
See also Files.

**Razors—**

Bornale..... 60 & 10¢  
Fox Razors, No. 42..... # doz. \$20.00  
Fox Razors, No. 44..... # doz. \$20.00  
Fox Razors, No. 84, Platina, # doz.....  
25.00  
Red Devil..... 60¢  
Silberstein:  
Carbo Magnetic..... \$18.00  
Griffon, No. 65..... \$15.00  
Griffon, No. 66..... \$12.00  
All other Razors..... 40¢  
Safety Razors..... 40¢

**Safety Razors—**

New Gem, in Tin Boxes..... # doz. \$12.00  
New Gem, Extra Blades..... # doz. \$8.35  
Gem Outfits (Razor, Strop, etc.).....  
# doz. \$5.60  
Complete Razor, extra Blade in Leather  
Case..... # doz. \$27.00

**Reels—Fishing—**

Bishop's Independent Fish Reel Spooler,  
# doz..... \$30.00  
Hendryx:  
M. S. Q. R. A. B. C. M. Q. 4008, Silver  
Rubber Populo, Nickel-plated Populo,  
Aluminum, German Silver, Bronze,  
3004 N. 06 N. 4 N to 8 P N..... 33 1/2¢  
6 RW, 102 P and RN, 202 P and PN 40¢  
G. B..... 20¢  
24 N to 28 P N..... 35&10¢10¢  
144 N, 74 P N, 002004 P N, 1020 R  
and PRN, 202 PR and PR N..... 50&5¢  
2904 N..... 40&10¢5¢  
5009 P N and N..... 50¢  
2004 P..... 50&10¢5¢  
3904 P N..... 60¢  
0925 N..... 40&10¢  
0924 N..... 45&12¢35¢  
Single Action, 802 and 802 N..... 50&10¢  
Comptor, 804 and 304 P N..... 35¢  
0304 P and P N..... 40&5¢  
Society and Salmon..... 30¢

**Registers—List Sept. 2, 1901.**

Black Jap..... 75¢@10¢  
White Jap..... 75¢@10¢  
Bronzed..... 75¢@10¢  
Nickel Plated..... 75¢@10¢  
Electro Plated..... 75¢@10¢  
There is a good deal of irregularity in  
prices of Registers.

**Revolvers—**

Single Action..... 85¢@90¢  
Double Act, except 44 cal. \$1.35@1.50  
Double Action, 44 caliber..... \$1.00@1.65  
Automatic..... \$2.75@3.00  
Hammerless..... \$3.25@3.50

**Riddles, Grain or Sand—**

16 in., per doz..... \$2.75@3.00  
17 in., per doz..... \$3.00@3.25  
18 in., per doz..... \$3.25@3.50

**Rings and Ringers—**

**Bull Rings—**  
Steel..... \$0.70 0.75 0.80 doz.  
Copper..... 1.00 1.10 1.35 doz.

**Hog Rings and Ringers—**

Hill's Rings..... # doz. \$4.25@4.50  
Hill's Ringers, Gray Iron, doz. 55¢@60¢  
Hill's Ringers, Mal. Iron, doz. 75¢@80¢  
Blair's Rings..... per doz. \$5.00@5.25  
Blair's Rings..... per doz. \$0.60@.65  
Brown's Rings..... per doz. \$5.50@5.75  
Brown's Ringers..... per doz. \$0.75@1.00

**Rivets and Burrs—**

Copper..... 50¢@10¢50¢10¢5¢  
Iron or Steel:  
Tinnars..... 75¢@75¢10¢  
Miscellaneous..... 75¢@75¢10¢

**Rollers—**

Acme, Stowell's Anti-Friction..... 50¢  
Barn Door, Sargent's list..... 60¢  
Cronk's Stay..... 60&5¢  
Cronk's Brinkerhoff..... 60&5¢  
Lance's Stay..... 30&5¢  
Stowell's Barn Door Stay..... # doz. \$1.25

**Rope—**

Manila, 7-16 in. and larger,  
tarred or untarred..... lb. 11 @ 11 1/2¢  
Manila, 3/4-inch..... lb. 11 1/2 @ 12 c  
Manila, 1/2 & 5-16 in..... lb. 13 @ 12 1/2¢  
Manila, Hay, Hide and  
Bale Ropes, Medium and  
Coarse..... lb. 15 @ 12 1/2¢  
Sisal, 7-16 in. and larger lb. 8 @ 10 c  
Sisal, 3/4-inch..... lb. 8 1/4 @ 10 1/2¢  
Sisal, 1/2 and 5-16 inch..... lb. 9 @ 11 c  
Sisal, Hay, Hide and  
Bale Ropes, Medium  
and Coarse..... lb. 8 @ 10 c  
Sisal, Tarred, Medium  
Lath Yarn..... lb. 7 1/2 @ 9 1/2¢  
Cotton Rope:  
Best..... 4-in. and larger, lb. 13 1/2¢  
Medium..... 4-in. and larger, lb. 11 c  
Com..... 4-in. and larger, lb. 9 c  
Jute Rope:  
Thread No. 1, 1/4-in. and up, lb. 6 1/2¢  
Thread No. 2, 1/4-in. and up, lb. 6 c  
Yarn, 1/4-in. and up..... lb. 5 @ 5 1/2¢  
Old Colony Manila Transmission Rope,  
# lb 17 1/2¢

**Wire Rope—**

Galvanized..... 40&5¢  
Plain..... 45&5¢

**Ropes, Hammocks—**

Covert Mfg. Co.:  
Jute..... 40&5¢  
Sisal..... 30¢  
Covert Saddlery Works..... 60&5¢

**Rules—**

Boxwood..... 60&10¢60¢10¢5¢  
Ivory..... 35¢@10¢35¢10¢5¢  
Chapin-Stephens Co.:  
Boxwood..... 60@60&10¢  
Ivory..... 35@35&10&10¢  
Miscellaneous..... 50@50&10&10¢  
Combination..... 55@55&10¢  
Stationers'..... 10¢@10&10¢  
Larkin's Steel..... 50&10¢  
Larkin's Lumber..... 60&10¢  
Stanley R. & L. Co.:  
Boxwood..... 60@60&10¢  
Ivory..... 35@35&10&10¢  
Upson Nut Co.:  
Boxwood..... 60@60&10¢  
Ivory..... 35@35&10&10¢

**Sash Locks—See Locks, Sash.**

**Sash Weights—**  
See Weights, Sash.

**Sausage Stuffers or Fillers**  
—See Stuffers or Fillers, Sausage.

**Saw Frames—See Frames, Saw.**

**Saw Sets—See Sets, Saw.**

**Saw Tools—See Tools, Saw.**

**Saws—**

Atkins:  
Circular..... 50@50&10¢  
Band..... 50&10¢60¢  
Cross Cuts..... 35&5¢  
Mulay, Mill and Drag..... 50&10¢  
One-Man Saw..... 40¢  
Wood Saws..... 40¢  
Hand, Compass, &c..... 40¢  
Chapin-Stephens Co.:  
Turning Saws and Frames..... 30@30&10¢  
Diamond Saw & Stamping Works:  
Sterling Kitchen Saws..... 25¢  
Diaston's:  
Circular, Solid and Inserted Tooth..... 50¢  
Band, 3 to 14 in. wide..... 60¢  
Band, 1/4 to 2 1/4..... 70¢  
Crosscuts..... 45¢  
Narrow Crosscuts..... 50¢  
Mulay, Mill and Drag..... 50¢  
Framed Woodsaws..... 35¢  
Woodsaw Blades..... 35¢  
Woodsaw Rods..... 25¢  
Hand Saws, Nos. 13, 99, 9, 16, d100,  
DS, 120, 79, 77, 8..... 25¢  
Hand Saws, Nos. 7, 107, 107 1/2, 8, 1,  
0, 00, Combination..... 30¢  
Compass, Keyhole, &c..... 25¢  
Butcher Saws and Blades..... 35¢  
C. E. Jennings & Co.'s:  
Back Saws..... 25&10¢  
Butcher Saws..... 30&10¢  
Compass and Key Hole Saws..... 35&5¢10¢  
Framed Wood Saws..... 30&10¢  
Hand Saws..... 20&2 1/2¢10¢  
Wood Saw Blades..... 30&10¢  
Millers Falls:  
Butcher Saws..... 15&10¢  
Star Saw Blades..... 15&10¢  
Peace:  
Circular and Mill..... 50¢  
Cross Cuts, list Jan. 1, '99..... 30¢  
Hand, Panel and Rip..... 30¢  
Richardson:  
Circular and Mill..... 50¢  
Hand..... 30¢  
X Cuts, list Jan. 1, '99..... 50¢  
Simonds:  
Circular Saws..... 50¢  
Crescent Ground Cross Cut Saw..... 35¢  
One-Man Cross Cuts..... 40&10¢  
Gang Mill, Mulay and Drag Saws..... 50¢  
Band Saws..... 30&10¢  
Back Saws..... 25&2 1/2¢  
Butcher Saws..... 30&10¢  
Hand saws..... 25&2 1/2¢  
Hand Saws, Bay State Brand..... 45¢  
Compass, Keyhole, &c..... 25&2 1/2¢  
Wood Saws..... 35&35&7 1/2¢

**Hack Saws—**

Atkins' Hack Saw Blades A A A..... 30¢  
Diaston:  
Concave Blades..... 25¢  
Keystone..... 40¢  
Hack Saw Frames..... 30¢  
Fitchburg File Works, The Best..... 25¢  
C. E. Jennings & Co.'s:  
Hack Saw Blades, Nos. 175, 180..... 35&5¢10¢  
Hack Saws, Nos. 175, 180, complete.....  
35&5¢10¢  
Griffin's Hack Saw Frames..... 35&5¢10¢  
Griffin's Hack Saw Blades..... 35&5¢10¢  
Star Hack Saws and Blades..... 15&10¢  
Sterling Hack Saw Blades..... 25¢  
Sterling Hack Saw Frames..... 20¢

**Scroll—**

Barnes' No. 7, \$15..... 25¢  
Barnes' Scroll Saw Blades..... 40¢  
Barnes' Velocipede Power Scroll Saw,  
without boring attachment, \$15,  
with boring attachment, \$30..... 20¢  
Lester, complete, \$10.00..... 15&10¢  
Rogers, complete, \$4.00..... 15&10¢

**Scalars, Fish—**

Bishop's Lightning..... # doz. \$3.00  
Covert's Saddlery Works..... 60&10¢

**Scales—**

Family, Turnbull's..... 30@30&10¢  
Counter:  
Hatch, Platform, 1/2 doz to 1 lb. doz. \$5.50  
Two Platforms, 1/2 oz to 1 lb. doz. \$16  
Union Platform, Plain..... \$1.70@1.90  
Union Platform, Striped \$1.85@2.15  
Challinor's:  
Eureka..... 25¢  
Favorite..... 40¢  
Grocers' Trip Scales..... 50¢  
Pelouze Scales—Household, Counter,  
Candy, Ice, Postal, Computing..... 30¢  
"The Standard" Portables..... 45¢  
"The Standard" R. E. and Wagon..... 50¢

**Scrapers—**

Box, 1 Handle..... doz. \$2.25@3.50  
Box, 3 Handle..... doz. \$3.00@3.50  
Ship Light, \$2.50; Heavy, \$4.00  
Adjustable Box Scraper (S. R. & L. Co.)  
\$6.00..... 30&10¢  
Chapin-Stephens Co., Box..... 30&10¢

**Screens, Window, and Frames—**

Flyer Pattern Window Screen..... 60@60&5¢  
Maine Window Screen Frames..... 40&10¢5¢  
Perfection Window Screens..... 60&10¢5¢  
Phillips' Window Screen Frames..... 60&5¢  
Porter's:  
Fairview Window Screens..... 60&5¢60&5¢2 1/2¢  
Hummer Window Screens..... 60&5¢60&5¢2 1/2¢  
Klondike Window Screens..... 60&5¢60&5¢2 1/2¢  
See also Doors.



**Screws—Bench and Hand—**

Bench, Iron, doz. 1 in. \$2.75@3.00  
 1 1/2, \$3.25@3.50; 1 3/4, \$3.50@4.25  
 Bench, Wood, Beech, doz. \$3.00@3.50  
 Hand, Wood, 1/2 doz. \$3.00@3.50  
 Hand, R. Bliss Mfg. Co. 35¢  
**Coach, Lag and Hand Rail—**  
 Lag, Common Point, list Oct. 1.  
 99. 70¢@10¢  
 Coach and Lag, Gimlet Point, list  
 Oct. 1, '99. 70¢@10¢  
 Hand Rail, list Jan. 1, '81.60¢@10¢

**Jack Screws—**

Standard List. 75¢@10¢@50¢  
 Millers Falls. 5¢@10¢@10¢  
 Millers Falls, Roller. 50¢@10¢  
 P. S. & W. Co. 50¢@10¢  
 Sargent. 70¢@10¢

**Machine—**

List Jan. 1, '98.  
 Flat or Round Head, Iron, 50¢@50¢@10¢  
 Flat or Round Head, Brass, 50¢@50¢@10¢

**Set and Cap—**

Set (Iron or Steel) 70¢  
 Sq. Hd. Cap. 65¢  
 Hex. Hd. Cap. 65¢  
 Rd. or Fillister Hd. Cap. 60¢

**Wood—**

List Jan. 1, 1900.  
 Manufacturers' printed discounts:  
 Flat Head, Iron. 87¢@10¢  
 Round Head, Iron. 85¢@10¢  
 Flat Head, Brass. 85¢@10¢  
 Round Head, Brass. 80¢@10¢  
 Flat Head, Bronze. 77¢@10¢  
 Round Head, Bronze. 75¢@10¢  
 Drive Screws. 87¢@10¢

**Scroll Saws—See Saws, Scroll.**

**Scythes—** Per doz.  
 Clipper Pattern, Grass. \$4.50@5.00  
 Full Polished Clipper. \$5.00@5.50  
 Grain. \$7.00@8.50  
 Clipper, Grain. \$7.75@8.25  
 Wood and Bush. \$4.75@5.00

**Seeders— Raisin—**  
 Enterprise. 25¢@30¢

**Sets— Awl and Tool—**  
 Broad Awl and Tool Sets:  
 Wood Hdlr., 10 Awls doz. \$2.00@2.25  
 Wood Hdlr., 14 Awls, 6 Tools  
 doz. \$3.50@2.60

Allen's Sets, Awl and Tools  
 No. 20, 2 doz. \$10.00 50¢@10¢  
 Fray's Adj. Tool Hdlr., No. 1, \$12; 2  
 \$18; 3, \$12; 4, \$2; 5, \$7. 50¢  
 C. E. Jennings & Co.'s Model Tool  
 Holders. 80¢@10¢  
 Millers Falls Adj. Tool Hdlr., No. 1  
 \$13; No. 4, \$11; No. 5, \$19. 15¢@10¢  
 Stanley's Excelsior  
 No. 1, \$7.50; No. 2, \$4.00; No. 3,  
 \$5.50. 30¢@30¢@10¢@10¢

**Garden Tool Sets—**  
 Ft. Madison, 3 Piece Plow, Hoe, Rake  
 and Shovel. 7 doz. sets. \$9.00

**Nail—**  
 Square. per gro. \$2.25@2.50  
 Round, Blk. and Poi., assorted.  
 gro. \$1.80@2.50

Octagon. per gro. \$4.00@4.25  
 Knurled, Good. per gro. \$5.75@6.00  
 Buck Brothers. 27¢  
 Cannon's Diamond Point, per gr. \$12. 35¢  
 Mayhew's. per gro. \$2.00  
 Snell's Corrugated, Cup Pt. per gro. \$2.50  
 Snell's Knurled, Cup Pt. per gro. \$7.50

**Rivet—**  
 Regular list. 70¢@10¢@75¢

**Saw—**  
 Genuine. 50¢@10¢  
 Imitation. 50¢@10¢  
 Atkin's. 40¢  
 Criterion. 40¢  
 Adjustable. 40¢  
 Bemis & Call Co.'s:  
 Cross Cut. 30¢  
 Hammer, new Pat. 45¢  
 Plate. 20¢  
 Spring Hammer. 30¢  
 Diaston's Star and Monarch. 25¢  
 Morrill's No. 1, \$15.00. 50¢  
 No. 3 and 4, Cross Cut, \$20.63. 50¢  
 No. 5, Mill, \$30.00. 50¢  
 No. 10, 11, 95, \$15.83. 50¢  
 No. 1 Old Style, \$10.00. 50¢  
 Giant Royal, Cross Cut. 50¢  
 Royal Hand. 50¢  
 Talbot Positive, 7 doz. \$15. 60¢

**Sharpeners, Knife—**  
 Chicago Wheel & Mfg. Co. 65¢  
 Smith & Hemenway Co. 70¢

**Shaves Spoke—**  
 Iron. doz. \$1.00@1.15  
 Wood. doz. \$1.65@2.25  
 Bailey's (Stanley R. & L. Co.). 50¢@50¢@10¢@10¢

Chapin-Stephens Co. 50¢@50¢@10¢@10¢  
 Goodell's, 7 doz. \$9.00. 15¢@10¢  
 Wood's F1 and F2. 50¢

**Shears—**  
 Cast Iron. 7 8 9 in.  
 Best. \$16.00 18.00 20.00 gro.  
 Good. \$13.00 15.00 17.00 gro.  
 Cheap. \$5.00 6.00 7.00 gro.  
 Straight Trimmers, etc.:  
 Best quality, Jap. 70¢@70¢@10¢  
 Nickel. 60¢@60¢@10¢  
 Fair qual. Jap. 75¢@75¢@10¢  
 Nickel. 75¢@75¢@10¢

**Tailors' Shears—**  
 Acme Cast Shears. 40¢@40¢@50¢  
 Geneva. 40¢  
 Hinch's Tailors' Shears. 40¢  
 Wilkinson's Hedze. 1900 list 45¢  
 Wilkinson's Pruning. 40¢  
 Wilkinson's Sheep. 1900 list 25¢

**Tinners' Snips—**  
 Steel Blades. 20¢@50¢@20¢@10¢  
 Steel Laid Blades. 40¢@10¢@50¢  
 Forged Handles, Steel Blades, Berlin  
 40¢@40¢@10¢  
 Jennings & Griffin Mfg. Co.'s, 6 1/2 to 10  
 inch. 40¢@75¢@10¢  
 Niagara Snips. 40¢  
 P. S. & W. Co. 20¢

**Pruning Shears and Tools—**

Crunk's Grape Shears. 33¢  
 Crunk's Pruning Shears. 33¢  
 Diaston's Combined Pruning Hook  
 and Saw, 7 doz. \$18.00. 25¢  
 Diaston's Pruning Hook, 7 doz. \$12.00. 25¢  
 John T. Henry Mfg. Co.:  
 Pruning Shears, all grades. 40¢@40¢  
 Orange Shears. 50¢@10¢@20¢  
 Grape. 40¢@10¢@50¢  
 Tree Pruners. 75¢  
 P. S. & W. Co. 33¢@33¢

**Sheaves—Sliding Door—**  
 Stowell's Anti-Friction. 50¢  
 Patent Roller Hatfield's, Sargent's list.  
 70¢@10¢  
 Reading. 70¢@10¢@75¢  
 R. & E. list. 33¢@33¢  
 Wrightville Hatfield Pattern. 30¢

**Sliding Shutter—**  
 Reading list. 70¢@10¢@75¢  
 R. & E. list. 33¢@33¢  
 Sargent's list. 50¢@10¢

**Shells— Shells, Empty—**  
 Brass Shells, Empty:  
 First quality, all gauges. 60¢@5¢  
 Climax, Club, Rival, 10 and 12 gauge.  
 65¢@5¢

**Paper Shell, Empty—**  
 Acme, Ideal, Leader, New Rapid,  
 Magic 10, 12, 16 and 20 gauge. 25¢  
 Blue Rival, New Climax, Challenge,  
 Monarch, Defiance, New Victor, Re-  
 peater, Yellow Rival, 10, 12, 16 and  
 20 gauge. 30¢  
 Climax, Union, League, New Rival  
 10 and 12 gauge. 25¢  
 Climax, Union, League, New Rival,  
 12, 14 and 20 gauge (\$7.50 list). 20¢  
 Expert, Metal Lined and Pigeon, 10,  
 12, 14 and 20 gauge. 33¢@33¢  
 Robin Hood, Low Brass. 30¢@10¢  
 Robin Hood, High Brass. 30¢@10¢

**Shells, Loaded—**  
 Loaded with Black Powder. 40¢  
 Loaded with Smokeless Powder,  
 medium grade. 40¢@5¢  
 Loaded with Smokeless Powder,  
 high grade. 40¢@10¢@10¢  
 Robin Hood, Low Brass. 30¢  
 Robin Hood, High Brass. 30¢@10¢@5¢

**Shoes Horse, Mule, &c.—**  
 F. O. B., Pittsburgh:  
 Iron. per keg \$3.85  
 Steel. per keg 3.60  
 Burden's, all sizes, per keg. \$3.90

**Shot—**  
 Drop, up to B, 25-lb. bag. \$1.50  
 Drop, H and larger, per 25-lb. bag. \$1.75  
 Buck, 25-lb. bag. \$1.75  
 Chilled, 25-lb. bag. \$1.75  
 Dust Shot, 25-lb. bag. \$2.00

**Shovels and Spades—**  
 Association List, Nov. 15, 1902. 40¢

**Sieves and Sifters—**  
 Hunter's Imitation, gro. \$11.00@11.50  
 Buffalo Metallic Blued, S. S. & Co., gr.:  
 14¢@10 16¢@18 18¢@20  
 \$12.90 \$13.80 \$15.00

National Mfg. Co.:  
 Victor. per keg \$12.00  
 Surprise. per keg \$11.00  
 No Name. per keg \$11.00  
 Shaker (Barber's Pat.) Flour Sifters.  
 7 doz. \$2.00. 30¢

**Sieves, Tin Rim—**  
 Per dozen.  
 Mesh. 1 1/2 16 18 20  
 Black, full size. \$1.20 1.25 1.30 1.35  
 Plated, full size. \$1.30 1.35 1.40 1.45  
 Black, scant. 1.00 1.05 1.00 1.05

**Sieves, Wooden Rim—**  
 Nested, 10, 11 and 12 inch.  
 Mesh 18, Nested, doz. \$0.65@0.75  
 Mesh 20, Nested, doz. 75¢@85¢  
 Mesh 24, Nested, doz. 90¢@1.00

**Sinks—**  
 Cast Iron—  
 Standard list. 60¢@60¢@10¢  
 Note.—There is not entire uniformity  
 lists used by jobbers.

**Skins Wagon—**  
 Cast Iron. 70¢@70¢@10¢  
 Malleable Iron. 40¢@10¢@50¢  
 Steel. 40¢@10¢@50¢

**Slates, School—**  
 Factory Shipments.  
 "D" Slates. 45¢  
 Noiseless Slates. 60¢@10¢@5¢  
 Wire Bound. 40¢

**Slaw Cutters—See Cutters.**

**Slicers, Vegetable—**  
 Sterling No. 10, \$2.00. 33¢

**Snaps, Harness—**  
 German. 40¢@40¢@10¢  
 Covert Mfg. Co.:  
 Derby. 40¢@50¢  
 High Grade. 45¢  
 Jockey. 30¢@10¢  
 Trojan. 45¢  
 Yankee. 30¢@25¢  
 York. 30¢@25¢  
 Covert's Saddlery Works:  
 Crown. 60¢  
 German. 60¢  
 Model. 60¢  
 Triumph. 60¢  
 Oneda Community:  
 Solid Steel. 60¢@5¢  
 Solid Steel. 60¢  
 Sargent's Patent Guarded. 60¢@10¢

**Snaths—**  
 Scythe. 50¢@50¢@10¢

**Snips, Tinnners'—See Shears.****Spoons and Forks—****Silver Plated—**

Good Quality. 50¢@10¢@60¢@10¢  
 Cheap. 60¢@50¢@10¢  
 International Silver Co.:  
 1847 Rogers Bros. and Rogers & Ham-  
 ilton. 40¢@10¢  
 Rogers & Bro., William Rogers Eagle  
 Brand. 50¢@10¢  
 Anchor, Rogers Brand. 60¢  
 Wm. Rogers & Son. 60¢@10¢  
 Simeon L. & Geo. H. Rogers Co.:  
 Silver Plated Flat Ware. 60¢  
 No. 77 Silver Plated Ware. 60¢@10¢

**Miscellaneous—**

German Silver. 60¢@60¢@10¢  
 Cattaraugus Cutlery Co.:  
 Yukon Silver. 50¢  
 Simeon L. & Geo. H. Rogers Co.:  
 German or Nickel Silver, Special list  
 10¢@10¢

**Tinned Iron—**

Teas. per gro. 45¢@50¢  
 Tables. per gro. 90¢@1.00

**Springs— Door—**

Gem (Coll). 20¢  
 Star (Coll). 30¢  
 Torrey's Rod, 39 in. 7 doz. \$1.10  
 Victor (Coll). 50¢@10¢@10¢

**Carriage, Wagon, &c.**

1 1/2 in. and wider:  
 Black or 1/4 Bright, lb. 54¢  
 Bright, lb. 54¢  
 Painted Seat Springs:  
 1 1/2 x 28, per pr. 50¢@55¢  
 1 1/2 x 2 x 28, per pr. 60¢@65¢  
 1 1/2 x 3 x 28 and narrower, per pr.  
 80¢@85¢

**Sprinklers, Lawn—**

Enterprise. 25¢@30¢  
 Mackay. 25¢@30¢  
 Philadelphia No. 1, 7 doz. \$1.80  
 \$15; No. 2, \$24. 30¢

**Squares—**

Nickel plated. List Jan. 5, 1900.  
 Steel and Iron. 70¢@10¢  
 Rosewood Hdl Try Square and T-  
 Bevels. 60¢@10¢@10¢@70¢  
 Iron Hdl. Try Squares and T-Bevels.  
 40¢@10¢@10¢@70¢  
 Diaston's Try Sq. and T-Bevels. 70¢  
 Winterbottom's Try and Miter.  
 40¢@10¢@40¢@10¢@10¢

**Squeezers— Lemon—**

Wood, Common, gro. No. 6, \$5.25  
 \$5.50; No. 1, \$6.25@6.50.  
 Wood, Porcelain Lined.  
 Cheap. doz. \$2.00@2.75  
 Good Grade. doz. \$3.00@3.50  
 Tinned Iron. doz. \$0.75@1.25  
 Iron, Porcelain Lined, doz. \$2.90@3.35

**Staples—**

Barbed Blind. lb. 6¢@6¢  
 Electricians' Association list. 80¢@10¢@10¢  
 Fence Staples, See Trade Report.  
 Galvanized, 1c less than Barb Wire  
 Polished, 20c less than Barb Wire.  
 Poultry Netting, Staples. per lb. 34¢@34¢  
 Grand Crossing Tack Co.'s list. 80¢@10¢

**Steels, Butchers'—**

Dick's. 30¢  
 Foster Bros. 30¢  
 Hartzell Cutlery Co. 30¢  
 C. A. Hoffmann's. 40¢

**Steelyards—**

Blacksmiths'. 40¢@10¢@50¢  
 Curtis Reversible Hatchet Die Stock. 25¢  
 Derby Sew Plates. 25¢  
 Gardner Die Stocks No. 1. 40¢  
 Gardner Die Stocks, larger sizes. 40¢  
 Green River. 25¢  
 Lightning Screw Plate. 25¢  
 Little Giant. 25¢  
 Reece's New Screw Plates. 25¢@30¢

**Stone—****Scythe Stones—**

Chicago Wheel & Mfg. Co.:  
 Gem Corundum, 30 inch, \$3.00 per  
 gro. 12 inch, \$10.00  
 Pike Mfg. Co. 1901 list:  
 Black Diamond S. S. 12.00  
 Lamolite S. S. 12.00  
 White Mountain S. S. 9.00  
 Green Mountain S. S. 9.00  
 Extra Red Washita, 4 to 8 in. 60¢  
 No. 1 Indian Pond S. S. 7.50  
 No. 2 Indian Pond S. S. 7.50  
 Leader Red End S. S. 7.50  
 Balance of 1901 list 33¢@33¢

**Oil Stones, &c.**

Chicago Wheel & Mfg. Co., 1901 list:  
 Gem Corundum Oil, Double Grit. 50¢  
 Gem Corundum Oil, Single or Double  
 Grit. 55¢  
 Gem Corundum Razor Hones. 55¢  
 Pike Mfg. Co. 1901 list:  
 Arkansas Stone, No. 1, 3 to 5 in. \$2.80  
 Arkansas Stone, No. 1, 5 to 8 in. \$3.50  
 Arkansas Stone, No. 1, 8 to 10 in. \$4.00  
 Lily White Washita 4 to 8 in. 60¢  
 Rony Red Washita, 4 to 8 in. 60¢  
 Washita Stone, Extra, 4 to 8 in. 50¢  
 Washita Stone, No. 1, 4 to 8 in. 40¢  
 Washita Stone, No. 2, 4 to 8 in. 30¢  
 Lily White Slips. 90¢  
 Rony Red Slips. 90¢  
 Washita Slips, Extra. 80¢  
 Washita Slips, No. 1. 70¢  
 India Oil Stones (entire list). 33¢@33¢

Hindustan No. 1, Regular. 10¢@8¢  
 Hindustan No. 1, Small. 10¢@8¢  
 Axe Stones (all kinds). 10¢@8¢  
 Turkey Oil Stones, 4 to 8 in. 30¢  
 Queer Creek Stones, 4 to 8 in. 30¢  
 Queer Creek Slips. 40¢  
 Sand Stone. 5¢  
 Belgian, German and Swaty Razor  
 Hones. 50¢  
 Natural Grit Carving Knife Hones.  
 85¢  
 Quick Edge Pocket Knife Hones.  
 85¢  
 Mounted Kitchen Sand Stone, 1/2  
 doz. \$1.50

**Stoners— Cherry—**

Enterprise. 25¢@30¢

**Stops Bench—**

Millers Falls. 15¢@10¢  
 Morrill's. 7 doz. No. 1, \$10.00. 50¢  
 Morrill's, No. 2, \$12.50. 50¢

**Door—**

Chapin-Stephens Co. 60¢@60¢@10¢

**Plane—**

Chapin-Stephens Co. 30¢

**Straps— Box—**

Cary's Universal, case lots. 20¢@10¢

**Hame—**

Covert's Saddlery Works. 60¢@10¢

**Stretchers, Carpet—**

Cast Iron, Steel Points. doz. 55¢@60¢  
 Sockel. 25¢@25¢

**Stuffers Sausage—**

Enterprise Mfg. Co. 25¢@25¢@7¢  
 National Specialty Mfg. Co., list Jan.  
 1, '97. 30¢

**Supports, Porch—**

Hoffman's Porch Supports. 25¢@25¢

**Sweepers, Carpet—**

National Sweeper Co.:  
 Marion, Roller Bearing, regular  
 finishes, full Nickel. \$24.00  
 Marion Queen, Roller Bearing,  
 Fancy Veneers, full Nickel. \$27.00  
 Monarch, Roller Bearing, Nickel. \$22.00  
 Monarch, Roller Bearing, Jap'ned. \$21.00  
 Marion Queen, Roller Bearing, Reg-  
 ular Finishes, full Nickel. \$24.00  
 Transparent, Roller Bearing, Plate  
 Glass Top, Nickel. \$32.00  
 Monarch Extra, Roller Bearing,  
 (17-inch case), Nickel. \$36.00  
 Monarch Extra, Roller Bearing (17-  
 inch case), Japanned. \$33.00  
 Perpetual, Regular Bearings, Nickel. \$20.00  
 Perpetual, Regular Bearings, Jap. \$18.00  
 Note.—Discount of 50c per dozen on  
 three-dozen lots. Discount of \$1 per  
 dozen on five-dozen lots.

**Tacks Brads, &c.—**

List Jan. 15, '99.  
 Carpet Tacks, American. 90¢@25¢@5¢

American Cut Tacks. 90¢@20¢@5¢  
 Suedes Iron Tacks. 90¢@20¢@5¢  
 Suedes Upholsterers' Tacks. 90¢@5¢@10¢@5¢

Gimp Tacks. 90¢@5¢@10¢@5¢  
 Lace Tacks. 90¢@5¢@10¢@5¢  
 Trimmers' Tacks. 90¢@30¢@10¢@5¢  
 Looking Glass Tacks. 70¢@10¢  
 Bill Posters and Railroad Tack. 90¢@5¢@10¢@5¢

Hungarian Nails. 80¢@20¢@5¢  
 Common and Patent Brads. 80¢@10¢  
 Trunk and Clout Nails. 80¢@5¢  
 Note.—The above prices are for  
 Straight Weights. An extra 5¢ is given  
 Star Weights and an extra 10¢@5¢ on  
 Standard Weights.

**Miscellaneous—**

Double Point Tacks. 90¢ and 5 tens  
 Steel Wire Brads, R. & E. Mfg.  
 Co.'s list. 50¢@10¢@60¢  
 See also Nail Wire.

**Tanks, Oil—**

Emerald, S. S. & Co. 30-gal. Each.  
 Emerald, S. S. & Co. 60-gal. \$4.25  
 Queen City S. S. & Co. 30-gal. \$3.65  
 Queen City S. S. & Co. 60-gal. \$4.50

**Tapes Measuring—**

American Ases' Skin. 40¢@10¢@50¢  
 Patent Leather. 65¢@80¢@5¢  
 Steel. 40¢@10¢@50¢  
 Chesterman's. 55¢@25¢@5¢  
 Keuffel & Esser Co., Steel and Metallic,  
 Lower list, 1899. 35¢  
 Lufkin's Steel. 33¢@35¢  
 Lufkin's Metallic. 30¢@30¢@5¢

**Teeth Harrow—**

Steel Harrow Teeth, plain or headed,  
 1/2-inch and larger, per 100 lbs. \$5.00

**Thermometers—**

Tin Case. 80¢@10¢@80¢@10¢@5¢

**Ties, Bale—Steel Wire,**

Single Loop. 80¢@80¢@10¢  
 Improved, Monitor, Cross Head,  
 Etc. 70¢

**Ties, Wall—**

Cleveland Wire Spring Co.:  
 Galv. St-1 5-32 x 6 1/4 in. 1000. \$10.00  
 Galv. Steel 5-32 x 8 1/4 in. 1000. \$11.00  
 Galv. Steel 5-32 x 1 1/4 in. 1000. \$12.00  
 Galv. Steel 5-32 x 1 1/4 in. 1000. \$14.00

**Tinners' Shears, &c.—**

See Shears, Tinnners', &c.

**Tinware—**

Stamped, Japanned and Pieced, sold  
 very generally at net prices.

<b>Tools—Coopers'—</b>	
L. & I. J. White	20@20&5
<b>Hay—</b>	
Myers' Hay Tools	30%
<b>Saw—</b>	
Atkins' Cross Cut Saw Tools	40%
Simonds' Improved	33%
Simonds' Crescent	25%
<b>Ship</b>	
L. & I. J. White	25%
<b>Transom Lifters—</b>	
See Lifters, Transom.	
<b>Traps—Fly—</b>	
Balloon, Globe or Acme	doz. \$1.15@1.25; gro. \$11.50@12.00
Harpn'r, Champion or Paragon	doz. \$1.25@1.50; gro. \$13.00@13.50
<b>Game—</b>	
Oneida Pattern	80@20&5
Newhouse	45@45&5
Hawley & Norton	65&5@45&10
Victor (Oneida Pattern)	75@75&5
Star (Blake Pattern)	60&5@60&10
<b>Mouse and Rat—</b>	
Mouse, Wood, Choker, doz. holes	8 1/2@9c
Mouse, Round or Square Wire	doz. \$5@90c
<b>Marty French Rat and Mouse Traps</b>	
(Genuine):	
No. 1, Rat, Each \$1.19 1/2; doz. \$12.00	
No. 3, Rat, doz. \$0.60; case of 50	\$5.25 doz.
No. 3 1/2, Rat, doz. \$4.75; case of 72	\$1.25 doz.
No. 4, Mouse, doz. \$3.50; case of 7	\$2.75 doz.
No. 5, Mouse, doz. \$2.75; case of 150	\$2.25
Schnyer's Rat Killer, No. 1, @ gr. \$30.00	
No. 2, @ gr. \$30.00; Mouse, No. 3,	\$18.00
J. M. Mast Mfg. Co.	50%
<b>Mouse, Rat</b>	
Blizzard	No. 12, \$3.00 No. 1, \$9.50
Old Nick	No. 30, 2.22 No. 2, 8.40
Joker	No. 5, 2.10 No. 3, 8.40
Imp'd Snap Shot, Mouse, per gro., 2	hole, \$2.40
Imp'd Snap Shot, Mouse, per gro., 4	hole, \$4.20
<b>Trimmers Spoke—</b>	
Bonney's No. 1 and 2	40%
Wood's E. I.	50%
<b>Trowels—</b>	
Disston Brick and Pointing	30%
Disston Plastering	35%
Disston "Standard Brand" and Gen.	35%
Kohler's Steel Garden Trowels, 5 in.	6 in. \$5.00
Kohler's Steel Garden Trowels, 6 in.	6 in. \$6.00
Never-Break Steel Garden Trowels	gro. \$6.00
Peace's Plastering	30%
Rose Brick and Plastering	25&5
Woodrough & McParlin, Plastering	25%
<b>Trucks, Warehouse, &amp;c.—</b>	
B. & L. Block Co.	
New York Pattern	50&10%
Western Pattern	60&10%
Handy Trucks	per doz. \$16.00
Crocker	per doz. \$15.00
Dalay Stove Trucks, Improved pattern	doz. \$18.50
Model Stove Trucks	doz. \$18.50
<b>Tubs, Wash—</b>	
No. 1 2 3	
Galvanized, per doz.	\$4.75 5.25 6.00
Galvanized Wash Tubs (S. & Co.)	
No. 1 2 3	90 90 90
Per doz. \$5.25 6.00 6.75 7.00 7.00 P. 90	
<b>Twine—Miscellaneous—</b>	
BC BC	
No. 9, 1 1/4 and 1 1/2 lb. Balls 17 1/2c 23 1/2c	
No. 12, 1 1/4 and 1 1/2 lb. Balls 17 1/2c 19 1/2c	
No. 18, 1 1/4 and 1 1/2 lb. Balls 15 1/2c 17 1/2c	
No. 24, 1 1/4 and 1 1/2 lb. Balls 15 c 17 c	
No. 36, 1 1/4 and 1 1/2 lb. Balls 14 1/2c 16 1/2c	
Chalk Line, Cotton, 1/2-lb. Balls	22@22 1/2c

<b>Cotton Mops, 6, 9, 12 and 15 lb. to</b>	
doz.	8c
<b>Cotton Wrapping 5 Balls to lb.</b>	
according to quality	11c@17c
<b>American 2-Ply Hemp, 1/4 and 1/2-lb.</b>	
Balls	13@14c
<b>American 3-Ply Hemp, 1-lb. Balls</b>	
	13@14c
<b>India 2-Ply Hemp, 1/4 and 1/2-lb.</b>	
Balls (Spring Twine)	8c
<b>India 3-Ply Hemp, 1-lb. Balls</b>	
	8c
<b>India 3-Ply Hemp, 1 1/4-lb. Balls</b>	
2, 3, 4 and 5-Ply Jute, 1/2-lb. Balls	7c
<b>Mason Line, Linen, 1/2-lb. Balls</b>	
No. 26, Mattress, 1/4 and 1 1/4-lb. Balls	7c
Wool, 3 to 6 ply	5@5 1/2c
<b>Binder—</b>	
Cents per lb	
Sisal	10 1/2
Standard	11 1/2
Standard Manila (550 ft.)	11
Manila (600 ft.)	12
Pure Manila (650 ft.)	12 1/2
F. o. b. Eastern Mill. Carload lots	1/4 cent less.
<b>Vises—</b>	
Solid Box	50c@10@50&10&5
<b>Parallel—</b>	
Athal Machine Co.	
Simpson's Adjustable	40%
Standard	40%
Amateur	25%
Bonney's	40%
Columbian Hdw. Co.	40%
Emmert Universal	40%
Pattern Makers' No. 1	\$15.00 net
Pattern Makers' No. 2	\$13.00 net
Pattern Makers' No. 3	\$15.00 net
Fisher & Norris Double Screw	15&10%
Hollands'	
Machinists'	40%
Keystone	65&5
Lewis Tool Co.	20@30%
Merrill's	20%
Miller's Falls	50&10&10%
Parker's	
Victor	20@25%
Regulars	20@25%
Vulcan's	40@45%
Combination Pipe	55&60%
Prentiss	20@25%
Sargent's	40%
Smith & Hemenway Co.	40%
Machinists'	40%
Jewelers	30%
Snediker's X. L.	33 1/2%
Stephens'	33 1/2%
<b>Saw Filers—</b>	
Bonney's, No. 1, \$13; No. 3, \$16	
Disston's D 3 Clamp and Guide, 50&5	
\$30	25%
Reading	60%
Wentworth's Rubber Jaw, Nos. 1, 3	and 3.
	45&50%
<b>Wood Workers—</b>	
Wyman & Gordon's Quick Action, 6	in., \$6.00; 9 in., \$7.00; 14 in., \$8.00.
<b>Miscellaneous—</b>	
Signal & Keefer Combination Pipe	
Vise	60%
Parker's Combination Pipe	60%
N7 Series	60%
187 Series	60&5
No. 870	40%
<b>Wads—Price Per M.</b>	
B. E., 11 up	60c
B. E., 9 and 10	70c
B. E., 8	80c
B. E., 7	90c
P. E., 11 up	1.25
P. E., 9 and 10	1.25
P. E., 8	1.50
P. E., 7	1.50
Ely's B. E., 11 and larger	\$1.70@1.75
Ely's P. E., 12 to 20	\$3.00@3.25

<b>Ware Hollow—</b>	
<b>Cast Iron, Hollow—</b>	
<b>Stove Hollow Ware:</b>	
Ground	50c@10@90%
Unground	60&5@65%
<b>White Enamelled Ware:</b>	
Maslin Kettles	70%
<b>Covered Ware:</b>	
Tinned and Turned	40%
Enamelled	50%
See also Pots Glue.	
<b>Enamelled—</b>	
Agate Nickel Steel Ware, list Nov. 1,	
'01	50&30%
Iron Clad Ware	70&10%
Lava, Enamelled	40&10%
Never Break Enamelled	50%
<b>Tea Kettles—</b>	
Galvanized Tea Kettles:	
Inch	6 7 8 9
Each	50c 50c 60c 65c
<b>Steel Hollow Ware.</b>	
Avery Spiders & Griddles	65&5@65&5
Avery Kettles	60%
Porcelain	50&5@50&10%
Never Break Spiders and Griddles	65&5
Never Break Kettles	60%
Solid Steel Spiders & Griddles	65&5
Solid Steel Kettles	60%
<b>Warmers, Foot—</b>	
Pike Mfg. Co., Soapstone	40@40&10%
<b>Washboards—</b>	
Solid Zinc:	
Crescent, family size, bent frame	\$3.00
Red Star, family size, stationary	protector
Double Zinc Surface:	
Saginaw Globe, family size, station-	ary protector
Cable Cross, family size, stationary	protector
Single Zinc Surface:	
Salad, family size, open back perfor-	ated
Saginaw Globe, protector, family	size, ventilated back
Brass Surface:	
Brass King, Single Surface, open	back
Nickel Plate Surface:	
No. 1001 Nickel Plate, Single Surface	
	\$3.00
<b>Washers—</b>	
<b>Leather, Axle—</b>	
Solid	35c@10c@10&5c@10c@10c
Patent	35c@10c@10&5c@10c@10c
Coil:	1/2 1 1 1/4 1 1/2 1 3/4
	9c 10c 11c 12c per 100
<b>Iron or Steel—</b>	
Size bolt	5-18 3/4 1/2 3/4 1 1/2
Washers	\$6.30 5.50 4.50 4.00 3.50
In lots less than one keg add 1/2c per	lb., 5-lb. boxes add 1/2c to list.
<b>Cast Washers—</b>	
Over 1/2 inch, barrel lots, per lb.	
	13 1/2@2c
<b>Wedges—</b>	
Oil Finish	lb. 2.90@3.10c
<b>Weights—</b>	
<b>Hitching—</b>	
Covert's Saddle Works	60&10%
<b>Sash—</b>	
Per ton, f. o. b. factory:	
Eastern District	\$26.00
Western, Central and Southern	Districts
	\$27.00
<b>Wheels, Well—</b>	
8-in., \$1.60@1.80; 10-in., \$2.00@2.25	
12-in., \$2.45@2.65; 14-in., \$3.00@3.25	
<b>Wire and Wire Goods—</b>	
<b>Bright and Annealed:</b>	
6 to 9	7 1/2c@7 1/2c@7 1/2c@10%
10 to 18	7 1/2c@10c@7 1/2c@10c@5%
19 to 26	7 1/2c@10c@7 1/2c@10c@5%
27 to 36	7 1/2c@10c@7 1/2c@10c@5%

<b>Galvanized:</b>	
6 to 18	70c@70c@5%
19 to 26	7 1/2c@5c@7 1/2c@10%
27 to 36	7 1/2c@10c@7 1/2c@10c@5%
<b>Coppered:</b>	
6 to 9	70c@5c@70c@10%
10 to 18	70c@10c@70c@10%
19 to 26	7 1/2c@7 1/2c@10c@2 1/2c
27 to 36	7 1/2c@10c@7 1/2c@10c@5%
<b>Tinned:</b>	
6 to 14	75c@75c@7 1/2c
15 to 18	7 1/2c@7 1/2c@7 1/2c
19 to 26	70c@70c@70c@5%
27 to 36	70c@70c@70c@5%
<b>Annealed Wire on Spools</b>	
Brass and Copper Wire on Spools	60@60&5
<b>Brass, list Feb. 26, '96</b>	
Copper, list Feb. 26, '96	20@30%
Cast Steel Wire	15c
Stubs' Steel Wire	\$1.00 to 2.50
Wire Clothes Line, see Lines	
Wire Picture Cord, see Cord	
<b>Bright Wire Goods—</b>	
List April 1, 1901	85c@10c@10c@90%
<b>Wire Cloth and Netting—</b>	
<b>Galvanized Wire Netting—</b>	
80@90&10%	
<b>Painted Screen Cloth per 100 ft. \$1.15</b>	
<b>Light Hardware Grade:</b>	
2-3 Mesh, Plain (8c. list) sq. ft.	13 1/2@2c
2-3 Mesh, Galv. (8c. list) sq. ft.	2 1/2c@2 1/2c
<b>Wire, Barb—See Trade Report.</b>	
<b>Wrenches—</b>	
<b>Agricultural</b>	
Baxter Pat'n S Wrenches	80@80&10%
<b>Drop Forged S.</b>	
Acme	45&5@70c@10%
Alligator	70%
Alligator Pattern	70%
Bull Dog	70%
Bemia & Call's	
Adjustable S.	35&5
Adjustable S Pipe	40%
Briggs' Pattern	30&10%
Combination Black	40&5
Combination Bright	40%
Cylinder or Gas Pipe	55%
Extra Heavy	50%
Merrick's Pattern	50%
No. 3 Pipe, Bright	55%
Roarman's	33 1/2%
Coe's Genuine	40&10&5&5%
Coe's Mechanics	40&10&10&5&5%
Donohue's Engineer	40&10%
Dudley Auto	50&5@50&10%
Eagle	50&10%
Elgin Wrenches	40%
Elgin Monkey Wrench Pipe Jaws	30&5
Gem Pocket	30%
Hercules	70%
V. & B. Machinist	
Case lots	50&10%
Less than case lots	50&5
Improved Pipe (W. & B.)	50&5
Solid Handles, P. S. & W.	50&5@50&5
Stillson	65%
Triumph	60&10%
Vulcan Ch.	50%
<b>Fruit Jar</b>	
<b>Triumph Fruit Can Wrenches</b>	
Syrup Cap Wrenches	per gro. \$19.20
T & B Fruit Jar Wrenches	per gro. \$8.00
T & B Fruit Jar Holders	per gro. \$16.50
<b>Wrought Goods—</b>	
<b>Staples, Hooks, &amp;c., list March 17</b>	
<b>Yokes, Neck—</b>	
<b>Covert Saddle Works, Trimmed—</b>	
<b>Covert Saddle Works, Neck Yoke</b>	
<b>Centers</b>	
<b>Yokes, Ox, and Ox Bows—</b>	
<b>Fort Madison's Farmers &amp; Freighters</b>	
<b>list net</b>	
<b>Zinc—</b>	
Sheet	lb 7 @ 7 1/4c

PAINTS, OILS AND COLORS—Wholesale Prices.

<b>White Lead, Zinc, &amp;c.</b>	
Lead, English white, in Oil	7 @ 9 1/2
<b>Lead, American White, in Oil:</b>	
Lots of 500 lb or over	
Lead, less than 500 lb	7 1/4
Lead, White, in oil, 35 lb tin	
pails, add to keg price	1/2
Lead, White, in oil, 13 1/2 lb tin	
pails, add to keg price	1/2
Lead, White, in oil, 1 to 5 lb	1 @ 1 1/4
Lead, American, Terms: For lots 12 tons	and over 1/2c rebate; and 2 1/2c for cash
if paid in 15 days from date of invoice;	for lots of 500 lbs. and over 2 1/2c for cash
if paid in 15 days from date of invoice;	for lots of less than 500 lbs. net.
Lead White, Dry in bbls.	6 1/2@6 1/4
zinc, American, dry	4 1/2@4 1/4
Zinc, Paris, Red Seal, dry	4 1/2@4 1/4
Zinc, Paris, Green Seal, dry	4 1/2@4 1/4
Zinc, Antwerp, Red Seal, dry	4 1/2@4 1/4
Zinc, Antwerp, Green Seal, dry	4 1/2@4 1/4
Inc. V. M. French, in Poppy Oil	
Green Seal	
Lots of 1 ton and over	12 @12 1/2
Lots of less than 1 ton	12 1/2@12 1/2
Zinc, V. M. French, in Poppy Oil	
Red Seal	
Lots of 1 ton and over	10 1/2@11 1/4
Lots of less than 1 ton	11@11 1/4
Discounts—V. M. French Zinc—Dis-	counts to buyers of 10 bbl. lots of one or
assorted grades, 1 1/2; 25 bbls., 2 1/2; 50	bbls., 4 1/2.
<b>Dry Colors.</b>	
Black, Carbon	5 @ 8
Black, Drop, Amer.	4 @ 7
Black, Drop, Eng.	4 @ 11
Black, Ivory	12 @ 21
Lamp, Com.	4 1/2 @ 6
Blue, Celestial	4 @ 6
Blue, Chinese	29 @ 32
Blue, Prussian	9 @ 30
Blue, Ultramarine	3 1/2 @ 15
Brown, Spanish	1 1/2 @ 1
Brown, Vandyke, Amer.	1 1/2 @ 2 1/2

<b>Brown, Vandyke, Foreign</b>	
Carmine, No. 40	\$3.25@3.50
Green, Chrome, ordinary	3 @ 6
Green, Chrome, pure	19 @ 26
<b>Lead, Red, bbls, 1/2 bbls. and kegs:</b>	
Lots less than 500 lb	
Litharge, bbls, 1/2 bbls. and kegs:	
Lead 500 lb or over	6 1/2
Lots less than 500 lb	7 1/4
Ocher, French Washed	5 @ 7
Ocher, Dutch Washed	5 @ 7
Ocher, American	7 ton \$10.00@13.00
Orange Mineral, English	8 1/2 @ 9 1/2
Orange Mineral, French	10 1/2 @11 1/2
Orange Mineral, German	8 1/2 @ 9 1/2
Orange Mineral, American	8 1/2 @ 9 1/2



## CURRENT METAL PRICES.

APRIL 29, 1903.

The following quotations are for small lots. Wholesale prices, at which large lots only can be bought, are given elsewhere in our weekly market report.

IRON AND STEEL—  
Bar Iron from Store—

Refined Iron:	
1 to 1 1/2 in. round and square.....	@ 2.20¢
1 1/2 to 4 in. x 1/2 to 1 in. ....	@ 2.40¢
1 1/2 to 4 in. x 1/2 to 5-16.....	@ 2.40¢
Rods—5/8 and 1 1/2 round and square.....	@ 2.40¢
Angles:	
3 in. x 1/2 in. and larger.....	@ 2.35¢
3 in. x 3/4 in. and 1/2 in. ....	@ 2.40¢
1 1/2 to 2 1/2 in. x 1/2 in. ....	@ 2.40¢
1 1/2 to 2 1/2 in. x 3/4 in. and thicker.....	@ 2.35¢
1 to 1 1/2 in. x 3/4 in. ....	@ 2.40¢
1 to 1 1/2 x 1/2 in. ....	@ 2.45¢
3/4 x 1/2 in. ....	@ 2.60¢
3/4 x 1/2 in. ....	@ 2.70¢
3/4 x 1/2 in. ....	@ 3.50¢
3/4 x 3/8 in. ....	@ 4.00¢
Teas:	
1 in. ....	@ 3.80¢
1 1/2 in. ....	@ 2.60¢
1 1/2 in. and larger.....	@ 2.50¢
Channels, 3 in. and larger.....	@ 2.50¢
Bands—1 1/2 to 6 x 3-16 to No. 8.....	@ 2.40¢
"Burden's Best" Iron, base price.....	@ 3.10¢
Burden's "H. B. & S. Iron, base price.....	@ 3.10¢
"Uster".....	@ 3.15¢
Norway Bars.....	@ 3.75¢
Norway Shapes.....	@ 4.00¢

## Merchant Steel from Store—

Bessemer Machinery.....	per lb
Toe Calk, Tire and Sleigh Shoe.....	@ 2.30¢
Best Cast Steel, base price in small lots.....	@ 7¢

## Soft Steel Sheets—

1/4 in. ....	2.50¢	No. 14.....	2.70¢
3/16 in. ....	2.50¢	No. 16.....	2.80¢
No. 8.....	2.50¢	No. 18.....	3.00¢
No. 10.....	2.50¢	No. 20.....	3.00¢
No. 12.....	2.60¢	No. 22.....	3.10¢

## Sheet Iron from Store.

## Black.

	One Pass, C. R.	G. R.
Nos. 14 to 16.....	Soft Steel	Cleaned.
Nos. 18 to 20.....	@ 3.00¢	@ 3.10¢
Nos. 22 to 24.....	@ 3.10¢	@ 3.20¢
Nos. 25 and 26.....	@ 3.20¢	@ 3.30¢
No. 27.....	@ 3.30¢	@ 3.40¢
No. 28.....	@ 3.40¢	@ 3.50¢

## Russia, Planished, &amp;c.

Genuine Russia, according to assortment.....	@ 11 1/2¢
Patent Planished.....	@ 10¢; B, 10¢, not.

## Galvanized.

Nos. 14 to 16.....	@ 3.24¢
Nos. 18 to 20.....	@ 3.31¢
Nos. 22 to 24.....	@ 3.38¢
No. 26.....	@ 3.45¢
No. 27.....	@ 3.52¢
No. 28.....	@ 3.59¢
No. 30.....	@ 3.67¢
No. 20 and lighter, 36 inches wide, 25¢ higher.	

## Foreign Steel from Store—

Best Cast.....	@ 15¢
Extra Cast.....	@ 18¢
Swaged, Cast.....	@ 16¢
Best Double Shear.....	@ 15¢
Blister, 1st quality.....	@ 13¢
German Steel, Best.....	@ 10¢
2d quality.....	@ 9¢
3d quality.....	@ 8¢
Sheet Cast Steel, 1st quality.....	@ 15¢
2d quality.....	@ 14¢
3d quality.....	@ 13¢
R. Muehle's "Special".....	@ 46¢
"Titanic" Annealed.....	@ 75¢
Hobson's Choice XX Extra Best.....	@ 35¢
Jessop Self Hardening.....	@ 45¢
Seamans' "Nelson" Steel.....	@ 40¢
Hobson's "Soho" Special Self-Hardening.....	@ 43¢

## METALS—

## Tin—

Duty.—Pigs, Bars and Block. Free.	Per lb
Banca, Pigs.....	@ 31 1/2¢
Straits, Pigs.....	@ 31 1/2¢
Straits in Bars.....	@ 32 1/2¢

## Tin Plates—

## American Charcoal Plates.

Calland Grade:	
IX, 14 x 20.....	@ 7.75
IX, 14 x 20.....	@ 8.25
Melyn Grade:	
IX, 14 x 20.....	@ 6.50
IX, 14 x 20.....	@ 7.75
Allway Grade:	
IX, 14 x 20.....	@ 5.50
IX, 14 x 20.....	@ 6.00

## American Coke Plates—Bessemer—

IX, 14 x 20.....	@ 4.70¢
IX, 14 x 20.....	@ 5.00¢

## American Terne Plates—

IX, 20 x 28.....	@ 89.50
IX, 20 x 28.....	@ 11.50

## Copper—

Duty: Pig, Bar and Ingot and Old Copper free.	
Manufactured, 2 1/2¢ per lb.	

## Ingot—

Lake.....	@ 15 1/2¢
Casting.....	@ 14 1/2¢

## Sheet and Bolt—

March 12, 1903.

Net.

	Not wider than	Not longer than	And longer than	64 oz. & over, 50 lb. sheet, 30 x 60 and heavier.	30 x 60, 45 to 50 lb.	24 oz. to 30 oz., 25 lb. to 25 lb.	16 oz. to 24 oz., 12 1/2 to 25 lb.	14 oz. and 15 oz., 11 to 12 1/2 lb.	12 oz. and 13 oz., 9 1/2 to 11 lb.	10 oz. and 11 oz., 7 1/2 to 9 1/2 lb.	8 oz. and 9 oz., 6 1/2 to 7 1/2 lb.	Lighter than 8 oz.
Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
30	72	80	81	81	81	81	81	81	81	81	81	81
30	96	80	81	81	81	81	81	81	81	81	81	81
30	96	80	81	81	81	81	81	81	81	81	81	81
36	72	80	81	81	81	81	81	81	81	81	81	81
36	96	80	81	81	81	81	81	81	81	81	81	81
36	96	80	81	81	81	81	81	81	81	81	81	81
48	72	80	81	81	81	81	81	81	81	81	81	81
48	96	80	81	81	81	81	81	81	81	81	81	81
48	96	80	81	81	81	81	81	81	81	81	81	81
60	72	80	81	81	81	81	81	81	81	81	81	81
60	96	80	81	81	81	81	81	81	81	81	81	81
60	96	80	81	81	81	81	81	81	81	81	81	81
72	96	80	81	81	81	81	81	81	81	81	81	81
72	96	80	81	81	81	81	81	81	81	81	81	81
72	96	80	81	81	81	81	81	81	81	81	81	81
108	96	80	81	81	81	81	81	81	81	81	81	81
108	96	80	81	81	81	81	81	81	81	81	81	81
108	96	80	81	81	81	81	81	81	81	81	81	81
132	96	80	81	81	81	81	81	81	81	81	81	81
132	96	80	81	81	81	81	81	81	81	81	81	81
132	96	80	81	81	81	81	81	81	81	81	81	81

Roller Round Copper, 3/8 inch diameter and over, 2¢ 20¢.  
Circles, Segments and Pattern Sheets, 3¢ per advance over price of Sheet Copper required to cut them from Cold or Hard Rolled Copper, 14 oz. square foot and heavier, 1¢ per lb. over the foregoing prices.  
Cold or Hard Rolled Copper, lighter than 14 oz. square foot, 2¢ per lb. over the foregoing prices.  
All Polished Copper, 20 in. wide and under, 1¢ per lb. advance over the price for Cold Rolled Copper.  
All Polished Copper, over 20 in. wide, 3¢ per lb. advance over the price for Cold Rolled Copper.

## Planished Copper—

1¢ per lb. more than Polished Copper.  
Copper Bottoms, Pits and Flats—  
14 oz. to square foot and heavier, 2¢ 20¢.  
12 oz. and up to 14 oz. to square foot, 2¢ 20¢.  
10 oz. and up to 12 oz., 2¢ 20¢.  
Lighter than 10 oz., 2¢ 20¢.  
Circles less than 8 in. diameter, 2¢ per lb. additional.  
Circles over 8 in. diameter are not classed as Copper Bottoms.  
Polished Copper Bottoms and Flats, 1¢ per lb. extra.

## Copper Wire—

	9 and 10	11 and 12
Nos. 00000 to 5	Base	Base
Nos. 6 to 13	1¢ 15¢	1¢ 15¢
Nos. 14 to 17	1¢ 15¢	1¢ 15¢
Nos. 18 to 20	1¢ 15¢	1¢ 15¢

## Seamless Brass Tubes—

Standard always Stub's gauge, unless otherwise ordered.  
Feb. 6, 1899. Net. Outside Diameter.

Stub's W.G.	B. & S. W.G.	1/4	5-16	3/8	7-16	1/2	9-16	5/8	3/4	7/8	1 1/8	1 1/4
4-11	3-9											
13	12											
13	12											
14	13											
15	14											
16	15											
17	16											
18	17											
19	18											
20	19											
21	20											
22	21											
23	22											
24	23											

## Copper Bronze and Gilding Tube, 3¢ per lb. additional

## Iron Pipe Sizes—Brass

1/4 1/2 3/4 1 1 1/4 1 1/2 2 2 1/4 3 3 1/4 4 4 1/4 5 6 inch  
36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80 82 84 86 88 90 92 94 96 98 100

## Copper, Bronze or Gilding Tube, 3¢ per lb. additional

## Braze Brass Tubing.

(To No. 19, inclusive.) June 6, 1893.  
Brown & Sharpe's gauge standard.

## Plain Round Tube, 1/4 in. up to 2 in.

Per lb.	1/4	3/8	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	1 1/2	1 3/4	2
Smaller than 1/4 inch.....												
3 inch.....												
Over 3 inch to 3 1/2 inch, inclusive.....												
Over 3 1/2 inch.....												

## Roll and Sheet Brass—

(Brown & Sharpe Standard Gauge.)

Over 3 inch to 3½ inch, inclusive	43
Over 3½ inch	50
Bronze and Copper, advance on Brass List, 3 cents.	
Discount from list %	25

**Roll and Sheet Brass--**  
 (Brown & Sharpe Standard Gauge.)

## Common High Brass.

Wider than and including

To No. 20, inclusive ..	.39	.42	.46	.50	.55	.60	.65	*
Nos. 21, 22, 23 and 24. .	.40	.43	.47	.51	.56	.61	.68	
Nos. 25 and 26 .....	.41	.44	.48	.52	.57	.63	.71	
Nos. 27 and 28 .....	.42	.45	.49	.53	.58	.65	.75	

\* Special prices not less than 80 cents.  
Add 1/2¢ per lb. additional for each number thinner than Nos. 25 to 38 inclusive. Discount from List..... 25%

## Wire in Colls.

List February 26, 1890.

Brown & Sharpe's gauge the standard.

Com. high brass. Low brass. Gilt-bronze and copper

All Nos. to No. 10, inclusive..... \$0.23

Above No. 10 to No. 16..... .25¢

No. 17 and No. 18..... .27¢

No. 19 and No. 20..... .29¢

No. 21..... .30¢

No. 22..... .31¢

No. 23..... .32¢

No. 24..... .33¢

No. 25..... .34¢

No. 26..... .35¢

No. 27..... .36¢

No. 28..... .37¢

No. 29..... .38¢

No. 30..... .39¢

No. 31..... .40¢

No. 32..... .41¢

No. 33..... .42¢

No. 34..... .43¢

No. 35..... .44¢